

# TREE FELLING TECHNIQUES MANUAL





***This manual is an excerpt from the Forest Industry Safety and Training Alliance “Loggers’ Safety Training Guide” compiled by the Sustainable Resources Institute, Inc. This IS NOT a substitute for proper safety training. It is highly recommended by the Great Lakes Regional Michigan Master Logger Certification Program that all persons involved in the logging industry should receive safety training annually. If you have any questions, comments, or concerns regarding this manual, please do not hesitate to contact the Sustainable Resources Institute, Inc. at: 877-284-3882 or [sri\\_dpeter@sbglobal.net](mailto:sri_dpeter@sbglobal.net).***

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# FELLING TREES

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Determine and develop a safe and efficient felling pattern from visual observation. Take into account such factors as landing area, wind direction, natural lean of trees, tree species, and terrain.

Prior to felling trees, identify hazards in the felling area such as widow-makers, snags, spears, hang-ups, spring poles, blowdowns, and unstable ground, and either eliminate or avoid them. This check will optimize safety and production.

Observe felling danger zones by keeping a safe distance (two tree lengths or more if necessary) between yourself, others, and equipment.

Prepare the felling area by clearing debris and obstacles from the base of the tree, establishing an escape route, and eliminating potential hazards.

Cut a notch using the open face or undercut method as described in the OSHA Logging Standard 29 cfr 1910.266(g) (2) (iii), making the selection based on tree species, size, lean, location, and safety. Develop a felling pattern to facilitate safe, efficient production.

After giving a warning understood by all personnel, make the appropriate back cut. The back cut on an open face notch should be at the SAME level as the notch. Establish the proper hinge wood (length approximately 80% of diameter breast height [DBH], width approximately 10% DBH) so that direction of fall is controlled and the potential for butt kickback is minimized.

Retreat a minimum of 20 feet from a falling tree by using an established escape route 45 degrees to the rear of the intended direction of fall while keeping the tree in view.

## PROPER TIMBER FELLING PROCEDURES

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1. Remove or avoid all dead snags or stubs.
2. Always look at the top of the tree for widow-makers, lodged trees, wires, and other hazards. Plan the direction for the fall of the tree. Clear an area around the tree before starting to cut.
3. Prepare a line of retreat 45° away from the line of fall. Be sure you are not hemmed in with underbrush or obstructions.
4. Before starting to cut, make sure no one is closer than two tree lengths away from felling operations.
5. Make a notch on all trees no matter how small the diameter.
6. Give a timely warning yell understood by all employees, just before the back or final cut is started.
7. Never cut a standing tree completely through. Leave sufficient wood between the notch and the back cut for the tree to hinge on; otherwise, you may lose control of the tree and it could kick back.
8. If too much hinge is left, the tree can split and possibly barber chair. At a minimum, this will degrade log value, or worse, injure or kill the feller.
9. Never leave a lodged or hung tree; always push or pull it down with the aid of a skidder, etc. If it has to be left unattended for any length of time, properly mark it to indicate a danger area.
10. Never cut on days of high wind velocity.
11. Never climb or cut sections out of lodged trees.
12. Never leave a lodged tree, as any vibration from machinery or a sudden wind could bring it down on a crew member or an unsuspecting person.
13. Fell the lean of the tree whenever possible, and into clear areas.
14. Retreat from a falling tree at a 45° angle away from the direction of the fall at least 20 feet from the tree. If possible, stand behind another tree at the end of your retreat path.

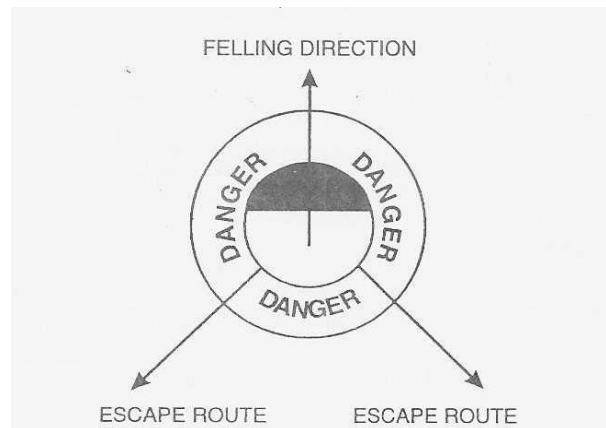
## PROPER FELLING IMPROVES QUALITY, QUANTITY, AND SAFETY BY REDUCING:

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- The number of trees falling in the wrong direction.
- The number of hung-up trees
- Pulled fibers and side scars.
- Damage to the butt log.
- The amount of time spent moving wood to the landing.
- Time spent pushing and pulling trees down.
- Time lost when a chain saw is pinched.
- Injuries from pushing and cutting at the same time.
- The possibility of a tree splitting in a barber chair.
- The number of tree butts kicking back off the stump.
- The possibility of trees being cut almost completely off and not falling.

## ESCAPE ROUTE

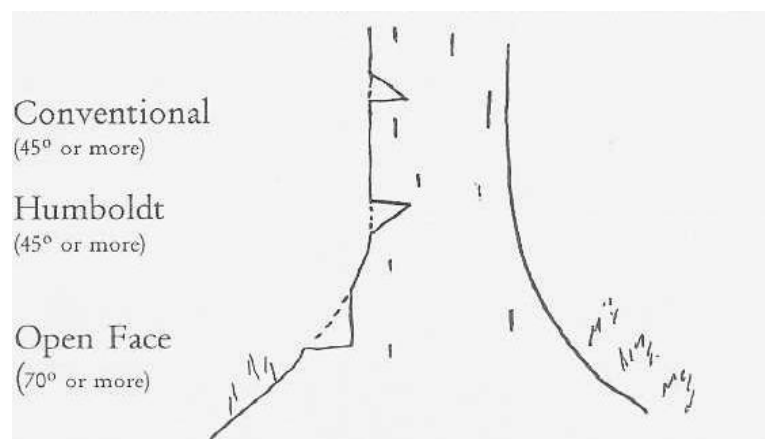
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The escape route shall be 45° angle away from the falling tree to a distance of at least 20ø from the tree.

## PROPER NOTCHES

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## PROPER DIMENSIONS OF NOTCHES

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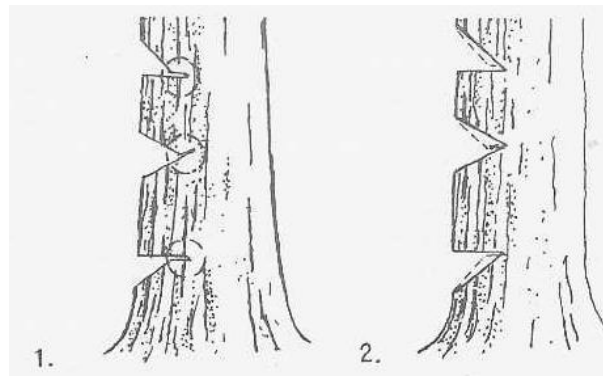
The depth of the notch should be  $\frac{1}{3}$  of the tree diameter. The face opening of a notch should be equal to the depth of the notch.



An open face notch is safest and requires an opening of 70% or more to prevent premature closing of the notch. Open face notches require the hinge length to be 80% or more of the DBH. The emphasis is on the length of the hinge, not the depth of the notch.

## THREE TYPICAL IMPROPER NOTCHES

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1. Improper notches
2. Portion of notch that must be removed to correct the proper cut.

## OPEN-FACE NOTCH (70 OR MORE)

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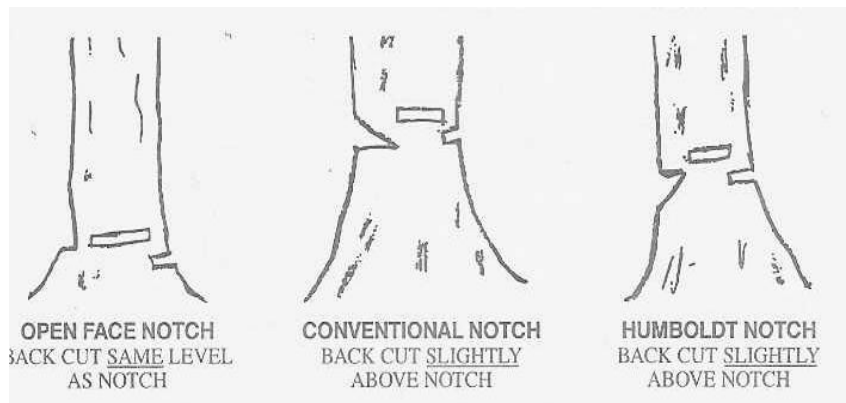
Bore cut to establish a hinge and cut toward the back of the tree. Stop the cut leaving enough holding wood on the back side of the tree. Then, release the tree from the back side with a cut below the bore cut.

Hinge wood of sufficient length and width is required to control the tree when falling. The bore (back) cut must be made at the same level as the notch to increase hinge strength. In many instances, this technique is considered the safest method to fell trees.




## PROPER BACK CUTTING

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## RESULTS OF IMPROPER BACK CUTTING


### 1. BACK CUT TOO DEEP (INADEQUATE HINGE)

	<p>The hinge will break almost immediately, resulting in inaccurate felling and damage to the bar or saw.</p>
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### 2. BACK CUT TOO HIGH ABOVE THE NOTCH

	<p>This highly increases the chance the hinge will break, allowing loss of control of the felling of the tree. It also produces a low quality butt.</p>
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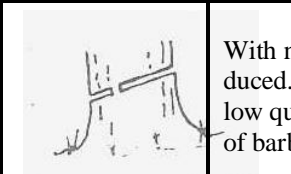
### 3. BACK CUT BELOW THE NOTCH

	<p>The same problems exist with this technique as with cutting above the notch. Bypassing the cutting of the notch will reduce hingewood strength and will allow the tree to freefall without control.</p>
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### 4. SLOPING BACK CUT

	<p>This cut lessens the chance of meeting the notch or leaves an inaccurate hinge producing a low quality butt.</p>
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### 5. ANGLE-BACK CUT WITH INADEQUATE NOTCH

	<p>With no notch, directional felling is greatly reduced. This cut produces loss of felling control, low quality butt, and greatly increases the chance of barber chairing.</p>
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## FELLING PROBLEM TREES

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Some trees present special problems in felling:

1. Trees that side scar easily (such as ash)
2. Larger trees ó light leaners or heavy tops
3. Heavy leaners
4. Felling trees against the natural lean

NOTE: Several of the following techniques any or may not require shallow side-cutting at the corners of the notch when cutting grade logs. Side-cutting is used on leaners to stop barber chairing and is often used on straight-grained trees such as oak and ash. *Side butting of log timber is a must!* This procedure will help reduce side scarring and fiber pull of the butt log; however, it also will reduce the strength of the holding wood or hinge.

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ALL OF THESE TECHNIQUES REQUIRE ADVANCED ABILITIES

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### TREES THAT SIDE SCAR EASILY

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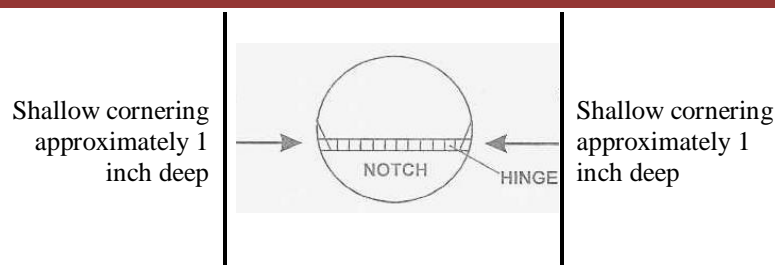
To prevent side scarring in standard felling, the sides of the hinge between the notch and the back cut are sawn before making the back cut.

As the tree falls, the stronger, more flexible fibers do not break when the notch closes.

Instead of breaking with the hinge, strips along the side of the tree rip off the butt log, resulting in side scars.

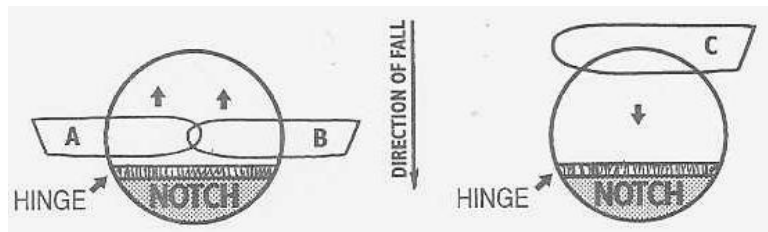
### NOTCHING

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METHOD TO USE WHEN THE TREE DIAMETER IS  
GREATER THAN THE LENGTH OF THE CHAIN SAW  
BAR, BUT NOT MORE THAN TWICE THE LENGTH OF  
THE BAR

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BORING TECHNIQUE

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1. The notch is made in the normal manner and the boring cut is **begun using the lower quadrant of the bar tip** starting, in most cases, on the side with side lean.
2. (See A) Once the wood is on both sides of the bar tip, the saw is straightened and the bore is completed just beyond the halfway point of the tree's diameter. Then, cut to the back leaving support wood. (See B) Repeat on the opposite side of the tree.
3. (See C) Pull the saw out and do a release cut on the backside of the tree.

NOTE: If boring is done incorrectly, there is an increased chance of kick-back; **use extreme caution.**

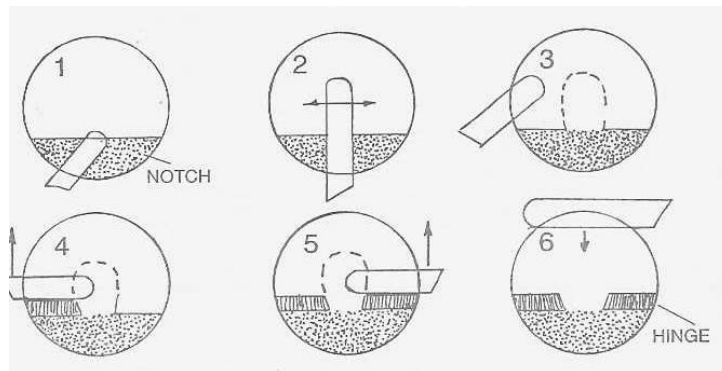
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CAUTION: WHEN USING THIS TECHNIQUE, THE SAW NEEDS TO BE RUNNING AT MAXIMUM RPM'S AND THE CHAIN NEEDS TO BE PROPERLY SHARPENED. PROFESSIONAL TRAINING IS ADVISED SO THAT THIS TECHNIQUE CAN BE PROPERLY UTILIZED.

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METHOD TO USE WHEN THE TREE DIAMETER  
IS GREATER THAN TWO TIMES THE  
CHAINSAW BAR LENGTH

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BORING TECHNIQUE

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1. The notch is made in the normal manner. A bore cut is made in the center of the notch using the lower quadrant of the bar tip.
2. Cut out as much wood as needed so the bar will reach from both sides. Remove the saw.
3. Start a bore cut at the normal level for a back cut, again using the lower quadrant of the bar.
4. Bore straight in, leaving enough hinge wood for the size of the tree. Walk the saw back, cutting approximately half the tree and leaving sufficient holding wood in back.
5. Repeat the procedure on the opposite side.
6. Use a release cut from the back side.

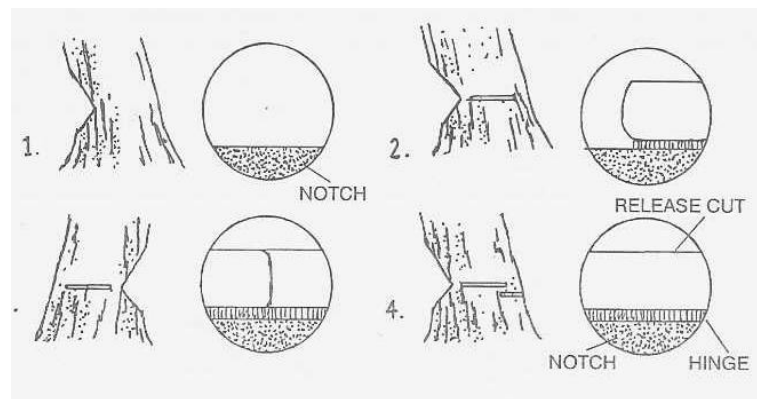
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**CAUTION: THIS IS A VERY PROFESSIONAL TYPE OF FELLING! A LARGE DIAMETER TREE MAY BE LEFT STANDING UNTIL A CUTTER CAN USE A LARGER SAW WITH A LONGER BAR. AGAIN, PROFESSIONAL TRAINING IS RECOMMENDED FOR THIS TECHNIQUE.**

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## HEAVY LEANERS

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## BORING TECHNIQUES

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1. Begin by making an open-face notch (70° or more); hinges length should be 80% DBH (or longer if necessary). For example, a 10ö DBH tree should have a hinge length of at least 8ö.
2. At the same plane as the notch, bore out the tree from the hinge wood back, while leaving sufficient holding wood at the back of the tree. Always start boring with the lower part of the bar tip. This is considered the safest felling technique.
3. The same boring procedure is then performed on the other side of the tree, ensuring that the two boring cuts meet. Omit this step if the tree is small enough for the saw bar to reach through the tree in one cut.
4. A final horizontal back-cut is made below the boring cut. The holding wood at the back severs and the tree falls, guided by the hinge. Always start boring with the lower part of the bar tip.

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**CAUTION: THIS IS A VERY PROFESSIONAL TYPE OF FELLING.  
IF YOU ARE NOT COMFORTABLE CUTTING THESE  
TREESö DO NOT DO IT!**

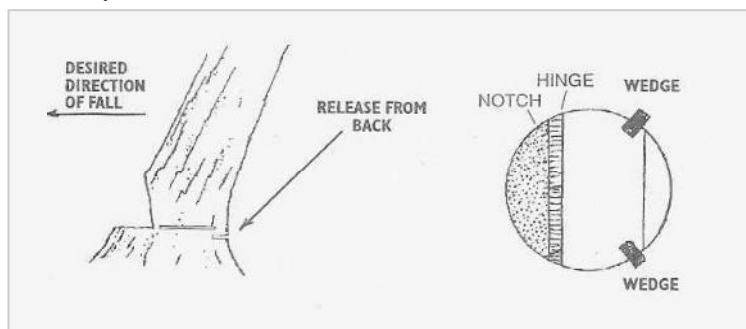
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## FELLING AGAINST THE NATURAL LEAN

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A large tree may be felled against its natural lean by using the boring technique. Use the open-face notch and bore cut the tree to establish the hinge. **DO NOT CUT OUT THE BACK.** Allow enough backwood to keep the tree secure. Remove the saw from the bore cut and insert wedges tightly into it. Release the tree from the back. Complete the technique by wedging the tree over. *This technique is for experienced cutters only.*



Felling against the natural lean may be necessary to:

- Avoid falling into other trees
- Place the tree in the desired direction
- Prevent a hang-up
- Avoid breakage
- Avoid disturbing the felling pattern
- Avoid falling on fences, across property lines, etc.

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## LIMBING AND BUCKING

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### LIMBING AND TOPPING TREES

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1. Identify hazards such as spring poles, compression and tension stress points, holes, and hanging limbs and/or tops. Chain saws and skidding equipment or related tools can minimize or eliminate problems such as saw kickback, limb/tree/springpole kickback, and tree roll.
2. Move back into the felling area to begin limbing and topping only after all debris produced by the falling tree is settled, and all potential hazards are eliminated.
3. Cut limbs and tops from felled trees using balanced footing, body position, and safe saw handling methods in accordance with utilization standards.

## SAFETY INSTRUCTIONS FOR LIMBING

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1. Make sure your footing is sound; keep your balance.
2. Start limbing from the butt end of the tree and work toward the top.
3. Always stay on the uphill side of the tree.
4. Always limb from the ground; do not walk on the tree.
5. When possible, stand with your feet in the clear, and limb from the left side of the tree.
6. Before moving forward, make sure the chain brake is on and the saw bar is on the opposite side of the tree.
7. To prevent kickbacks, do not limb with the kickback corner of the saw. Make sure the saw is at full speed before cutting a limb.
8. Treat limbs under tension the same as spring poles.
9. Cut supporting limbs last using extreme caution as the log may roll.
10. When cutting large limbs, be alert for the chain binding and kicking back. Use the limb lock technique.
11. Keep a minimum of two tree lengths away from the feller and falling trees.
12. When cutting limbs under tension, use a limb lock technique. Relieve pressure on the limb by making the first cut on the compression side. The second cut should slightly bypass the first cut, allowing the limb to lock into itself .

