

# Logging

## Installment 1 S·A·F·E·T·Y

By Robbo Holleran

**Most landowners have neither the time, equipment, or desire to do their own woods-work, and have to rely on contractors or timber sales to achieve their forestry goals. A few hardy souls undertake these tasks with ambitious effort, and I am honored to have you in this audience.**



Do-it-yourself woodlot management is full of hearty challenges, and doing it well is very rewarding. There are safety issues, equipment limitations, production issues, planning problems, tax considerations, and a long list of benefits. Controlling the quality of work in your woods is first, and there are the financial benefits of earning the “logging rate” for your products and perhaps a retail rate on special products and “project wood.” Annual firewood harvesting is most common and a great way to do forest improvement, maintain trails, and get exercise. Using your brain, body, and equipment well is a worthy challenge. The first installment in this series will

cover safety.

Woods-work is dangerous. Gravity is reliable, and there are tons of material on every acre waiting for a chance to fall on you. Felling trees, other chain-saw work, and moving wood from the stump to the road or woodstove is fraught with perils. These challenges are part of what makes this effort so satisfying. Discretion is the better part of valor and you probably have a lot to live for, even more than watching your crop trees grow to maturity. Using your head for more than pushing over trees is the beginning of reducing your risk of injury.

Chain-saw chaps or pants are a “must” every

time you pick up a saw, along with a helmet with both face and ear protection. Hard-toe boots and appropriate gloves are also recommended, along with high-visibility clothing. A lot of this is available from advertisers in this magazine, and most local saw shops will have some selection. A common objection is that this gear is hot and heavy. I tend to use chain-saw pants in the winter and chaps when it is warmer since they are more ventilated. Gloves come in winter and summer weights also. A hard hat with ear protection is warm in summer and you can raise the earflaps when the saw is not running. The cost is a factor, with basic gear running several hundred dollars, not counting boots. All this is less than the cost of the first stitch in the emergency room, let alone the embarrassment of explaining how you got injured. A small limb the size of a baseball bat, falling from the canopy will hit you just like a baseball bat. I've been clobbered a few times and saved by wearing the hat.

Training for chain-saw safety and productivity is also available, and I can't imagine doing this work without the skills and tips I have learned. Much of the training is directed at professional loggers or arborists, but landowners are always welcome if you pay the admission fee. "Game of Logging" is the best-known system with franchises in 30 states, and they offer specialized courses for landowners and students. They have top-notch instructors and a proven method for you to retain the information. Check with your state forest landowner's organization for dates and availability. Training should include basic saw maintenance like sharpening and carburetor adjustment, along with specific felling techniques for safety and accuracy. There are ergonomic tips for how to handle your body, saw, and trees that add up to greater productivity as well.

There are safety considerations for your equipment as well. Whether you have draft animals, an ATV, tractor, or skidder, there are accessories and techniques that reduce risks to you and damage to your mode of transport. Rollover protection for tractors is essential. The first time I rolled my tractor (and lived to tell the tale) I had a cab fabricated that also protects against branches and falling debris. A skid plate under the tractor is best to protect the mechanisms against limbs, stumps, and rocks underneath. Skidders are made with this protection, and ATVs are harder to outfit with this gear. "Utility tractors" from 25–75 hp are a common feature for woods-work and all sorts of accessories are available.

Keeping your equipment on terrain that is suitable is the first step. Woodlots with excessively steep terrain or boulder ground will not be suitable for some equipment. We have a project where the landowner hires an excavator for a couple days every few years to

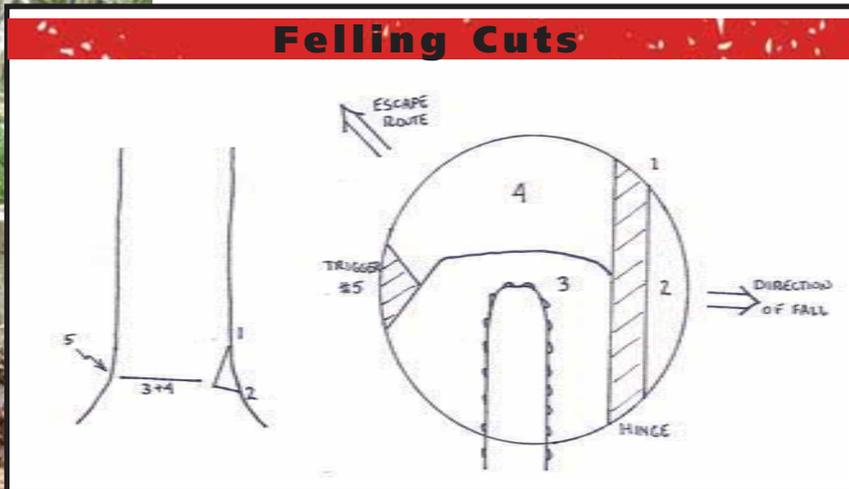


**An ATV with trailer is an effective tool for small-scale firewood salvage. This is the author, on vacation in the Poconos.**

build decent trails for his small tractor. This is an expense but allows him to access new sections of his woodlot much more safely. And nice trails are always useful.

A winch is a powerful addition to a tractor or ATV and there are power winches that can be used in conjunction with horses, too. There are many choices in the marketplace to suit your equipment and they can make it much easier to keep your equipment on the trail or decent terrain. A winch is also useful to pull over trees with lean, dislodge hung trees, or remove tension from a stem before cutting. The very power of the winch can create new hazards. A snapping cable is unpredictable. I have a Farmi winch on a Kubota tractor, and it has enough power to easily slide the tractor back toward the load, or even tip it over. You need to be aware of the forces involved and stand in a safe place while winching the load. The power and finesse of a winch can improve your safety and productivity, but it can also encourage you to attempt the foolish. Some logs might be able to be moved by the winch, but are simply too heavy for the tractor or ATV. There are hung or standing dead trees that are just too risky. You might think that some initial cuts with a chain saw will prepare the tree to be winched over from a safe distance, but limbs and broken pieces are waiting for the inevitable call of gravity. Ash trees killed by the emerald ash borer are reported to be especially brittle. There is a reason these are called "widow-makers." Some trees are just not worth the risk, and there is probably easier and safer firewood to salvage. With risky hung trees, sometimes the best course is to leave it for a week or so while you work other areas; perhaps the wind and weather will catalyze the work of gravity. Hanging some "Hazard Tree" or "Warning" flagging will help to remind you and protect others in your woodlot.

Recently, a landowner asked me to come show him the modern felling technique. Chain-saw felling is always risky, and most fatalities happen in a circle



**Above: Diagram showing the felling cuts in side-view and top-view for the open-faced notch (1 & 2), with bore-cutting (3 & 4) and a trigger (5).**

**Left: The author, in proper gear, using wedges to fall a tree away from the lean. This gets more complicated.**

within about 10 feet of the stump. This is called the “circle of death.” Do I have your attention? There are all sorts of things that can go wrong. As the tree begins to sway, dead branches might be held by a sliver of rotten wood and the slightest movement can begin their descent. As the tree moves further it can brush against another tree with considerable force, compounding the risks. There are also severe forces at the stump with the full weight of the tree (tons!) accelerating. Especially as it rubs or bounces against another tree, these forces are unpredictable. Twist, fiber pull, and even splitting an entire trunk are possible and can make for an exciting moment, or worse. A falling tree can also knock the top or branches out of another tree creating risk more than a tree-height away. The good news is that it takes more than a second for a branch to fall from the canopy and this is the time you have to get out of the “circle of death.” Remember that phrase and it might save your life.

Modern felling techniques are based on safety and productivity. Accuracy is part of both. If you can drop that tree in precisely the right direction, you are less likely to hang it up or create other hazards, and it will be easier to access and extract. Plastic felling wedges are a handy tool to fell trees across, or even against a slight lean. We start with the “open-faced notch,” which is contrasted to the traditional narrow felling notch that has to close while the tree is mid-descent, and the hinge has to break for the tree to continue. The hinge is the next essential element, which should control the direction of fall and bend instead of break. The felling cut or cuts create the hinge and sever the

trunk. There are many good videos on proper techniques and even more on improper techniques.

There are all sorts of judgements here. Size, weight, and species of the tree, any lean, wind, branches, and decay, other trees or obstacles, selected direction of fall and terrain all play a role in how best to approach each tree. While experience is the best teacher, it is best to skip any tree that stretches your comfort zone too much. Professionals assess the variables above to decide if the tree can be safely felled, how to set up the hinge, and the best way to sever the tree.

Once a tree has been selected for felling and evaluated for acceptable risk and desired direction of fall, the next choice is your escape route from the “circle of death.” This should be away from the direction of fall, but not directly behind the stump; 45 degrees from straight back is considered best, since there are forces that can jump a tree backwards from the stump. The escape route should be cleared of debris and saplings, and be clear in your mind for the critical moment. It needs to be your instinctive path to safety and accessible from your location at the final cut.

The “open-faced notch” starts with a high angled cut (#1 in the diagram), which might be vertical if there is enough root swell. Modern chain saws have some element of the plastic cover which is perpendicular to the bar which functions like a gun sight. Holding the saw nearly vertical along the intended cut and lining up these marks with your felling options, you select the desired direction, such as “to the right of the oak tree and left of the stump.” Cutting down into the tree at a slight angle will create the front of

the hinge. This is most important in determining the direction of fall and can be done with great precision using the “gun sight.”

Cut #2 comes up at a slight angle to match up with the bottom of the first cut. You can look down the kerf to make sure you don’t cut too far, which would change the shape of the hinge. If the first cut went too far, the front of the hinge is still correct, but further down the stump. The wedge-shaped notch should fall away but may need some persuasion. These two cuts have made the front end of the hinge.

The next cuts create the back edge of the hinge and sever the tree. These are called the felling cut or cuts. Unless it is a small tree, there are commonly two or three cuts. The optimal hinge size is about 80% of the tree diameter in length and 10% in thickness, though the strength of the wood is a factor. On smaller trees, you might simply cut in from the back, and stop when you get to the correct hinge size. There are two problems here: It is easy to misjudge the hinge size, either too thick or too thin, and the tree can start moving while you are still cutting. You want to be stepping out of the “circle” on your escape route as the tree starts to move. The next level of proficiency involves cuts #3 and #4 in the diagram. This is suited to larger trees with lean or other moderate risk factors, and has to be at least 10 inches at the stump for safe bore-cutting.

Bore-cutting—inserting the tip of the bar into the wood—is risky. The saw can kick back toward your face or leg with incredible speed and force. The rakers have to be filed correctly. It takes practice to be able to cut in with the bottom side of the tip and then insert the bar, so practice this first on a stable piece of firewood instead of your felling experiments. The third cut bores into the stem just above the front of the hinge, horizontally, into the middle of the stem. I like to do this on the side AWAY from my escape route since the tree is still stable at this point. This might be the risky side because of dead branches, lean, or other factors. Once the bar has been inserted all the way into the tree (and it may extend out the far side—and you should have checked for rocks or other hazards initially), cut toward the hinge to make the correct thickness. I like to make the hinge thicker on weak wood like pine or fir, and perhaps thinner on trees prone to split, like ash or hickory. And if the hinge will have extreme stress such as felling perpendicular to the lean, leave a bit extra on the tension side instead of the compression side. Once this side of the hinge has been established, you can cut toward the back of the tree, leaving the “trigger” in place. If cut #3 is on the compression side of the lean, you can insert plastic felling wedges at this stage and firm them up with a hammer or axe head.

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The fourth cut prepares the tree for felling. This should be made on the side with your escape route, which is fixed in your mind. Bore cut on this side, and if your saw has come through, it will be relatively easy to match these up. Cut toward the hinge first, creating that “ideal” hinge size and shape. I like to do this with the bar only partway into the tree so you can see the angle of the cut. Then cut through the stem toward the back, creating the trigger. In some cases, the trigger can break, such as with severe lean on the tree. If it does, it might be a surprise, but at least the hinge has been created and the tree should go where intended. Normally, the trigger will hold and the tree will be risky but stable. This gives you a chance to stand up and double-check your escape route, make sure that no visitors such as your pesky forester have arrived, your tractor and gas can are in a safe place, your wedges are where you need them, and everything is ready.

The trigger might be 3 or 4 square inches of wood, holding the tree in place with the hinge. With the old technique, you were kneeling down next to the tree and continuing to cut while the tree started falling. You were wishing you had a bigger, sharper saw. You were praying that you did not run out of gas and that the tree did not barber-chair or have some other crisis. Now you are standing a step away from a stable tree,

double-checking everything. If everything is copacetic, you lean in and make a quick cut through the trigger. As the tree slowly begins to move, you continue to watch the tree and back out your escape route. You should be outside of the “circle” before a limb can reach the ground. The hinge directs and controls the tree all the way to the ground, where it usually breaks cleanly when it hits the floor. This takes a little more time than simply hacking off the tree. But it saves time with precise felling, lack of hung-up trees, and easier extraction. And you can see it is much safer. There are all sorts of modifications for trees with problems like extreme lean, rot, oversized, etc. There are other techniques for bucking logs safely and cleanly, especially if there is tension on the stem. You can see that there are thought processes that involve the physical aspects of wood and gravity that are generally reliable. Doing your own woods-work can be especially rewarding, and you might as well learn to do it well and safely. ■

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**Robbo Holleran is a private consulting forester helping landowners meet their goals in Vermont and adjacent areas. His work has him outdoors about 150 days each year, plus play time. He is one of the authors of the new *Silvicultural Guide for Northern Hardwoods*.**



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