FACT SHEET

No. 31 a

Timber & Timber Harvesting in West Virginia

Spring 2002

Logging and Residual Stand Damage

Burning around a tree until it fell over or cutting it off with an axe were the primary methods of felling trees until about 1870 when the crosscut saw became popular. The primitive chain saw of the 1930's was perfected in the late 1940's. Afterwards one man could do the work of two. Now there are mechanical harvesters that enable a single operator, on suitable terrain, to sever a tree and lay it gently on the ground.

In the days of the crosscut, loggers using wedges and skill were adept at directional felling. They had to be, a hung tree was a severe problem. This skill was often overlooked with the ascendancy of the chainsaw, especially by new loggers without crosscut experience. As the drive for speed and maximization of profit became popular, trees were often felled willy-nilly – cut them off and let them fall unguided. Aesthetics and damage to the residual stand were ignored and the public, justifiably so, began to protest.

There is no reason that most stands can not be pleasing to a viewer's senses after a timber harvest under the selection system. Buffer zones and controlled felling teamed with the cutting of snags, culls and heavily injured trees goes a long way towards doing this. The forester marking the trees for harvest can help minimize damage by also marking trees for harvest that may be severely injured when a nearby tree scheduled for harvest is felled.

Some felling damage in inevitable, but it can and should be minimized. The forester and the landowner should insist upon it.

The residual stand can be damaged in several ways – via the trees crown, stem, roots and the soil it grows in. A felled tree falling through the top of another and ripping off twigs and limbs causes top damage. A felled tree sliding down the trunk of another tearing the bark or when trees or logs being pulled to a loading point bump against a tree and remove a strip of bark causes stem damage. Bulldozers hitting trees when building roads also cause trunk damage. Top and stem damages degrade the tree and the wounds allow the entrance of fungi that incite rot. Some very susceptible trees, such as red maple, may be rendered practically worthless as little as 10 years after wounding. Root damage is common. Most tree roots grow within the upper foot of soil and crushing or cutting is common. Operating only on frozen or dry ground decreases root damage.

Even heavy anchor roots seldom go deeper than two feet and the small fibrous roots that provide the water and nutrients to trees are in the upper inch of soil. Soil damage is caused by heavy equipment compacting, moving or rutting it. Some states limit machinery to so many pounds per square inch (psi), often to no more than 12 pounds. The average pickup truck has a psi of 15, a draft horse 10, tracked skidder 8.5, 10 ton 4-wheeled forwarder 13.5, 10 ton 6-wheeled forwarder 10, 12 ton 6-wheeled forwarder 11.5, small dozer and winch 7.5 etc. The average man has a psi of about 3.75.

Residual stand damage is the percentage of trees left for the next crop that have been damaged. Past research has shown that crosscut saw and horse logging averaged about 5% damage, chain saw-
skidder operations up to 40% and mechanical harvesting systems from 5 to 80%.

Research* has shown that a one- percent systematic sample will provide a reasonable indication of the damage done to the residual trees. When very small woodlots are being checked, no less than 100 trees should be measured.

A topographic map of the property is necessary for planning the study. Sketch the skid roads on the map. Then draw the cruise lines, as nearly perpendicular to the skid roads as possible, on the map. This is important because there is usually more damage near skid roads and less near the margins of the property. Try to avoid landings also as the skid roads converge there and this will give a biased result.

As an example, consider a 100 acre harvest. A 1% sample will be one acre. There are 43,560 square feet in an acre so the trees on this much area must be counted and checked. It is recommended that a strip 10 feet wide, five feet on each side of a compass line, be used. Thus 4,356 feet of line will be checked (4,356 x 10 = 43,560 square feet or one acre which is 1% of the 100 acre tract.). The width of the tract is scaled from the map and this is used to decide the number of lines to run to get 4,356 feet. Three lines will each be 1,432 feet long, four 1,089 feet, five 871 feet, etc. The appropriate number of lines are then spaced evenly across the tract.

The technique involves cutting a five-foot stick and using it to gauge whether trees are within five feet of the centerline. All trees more than five inches dbh are counted.

The trees are recorded as no damage and light, moderate and heavy damage. Light is a scrape on one side of a tree covering no more than an eighth of the stem's diameter, ruts less than 6" deep under the crown of the tree or slight damage to one of the trees major branches. Moderate is two sides of the tree with scrapes covering one-fourth of the trees diameter, visible damage to the roots (cut or exposed), ruts deeper than 6" and damage of up to a quarter of the trees smaller branches. Severe is bark scraped off the trunk on more than ¼ of the tree diameter, evident damage to the sapwood, more than 25% of the roots damaged or more than 1/8 of the trees major branches showing damage. Slight damage seldom kills the tree and future product is probably not greatly degraded; moderate damage seldom kills the tree, but future product value is greatly lessened; and

severe damage usually causes tree death within 3-5 years and if not it definitely degrades future values to pulpwood or less.

The number of damaged trees is divided by the total number of trees counted to get the percentage of damage. A figure above 25% is definitely unacceptable for selection harvests in hardwood forests. Ten percent or lower is considered very good.

In high value stands, the statistics should be weighed. One way is to count light damage as one, moderate damage as three and severe damage as five. These are then added and used as the number damaged in place of the unweighted number.

Most professionals accept these or similar guidelines as the usual way of doing business. Remember, for the future what is left is as important or even more so than what is cut.

(Compiled by William H. Gillespie from information in the *American Pulpwood Association's (now the Forest Resource's Association) northeastern technical division safety and training committee's 40 page bulletin 97-A-14.)

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