

# FACT SHEET

No. 31

## Timber & Timber Harvesting in West Virginia

August, 2001

### **Residual Stand Damage Can Be A Serious Logging Problem.**

It is impossible to harvest trees without damaging some of those left for the next crop. However, directional felling, care in skidding, ceasing work when the ground is wet or thawing and limiting the size of machinery and loads will decrease the damage. Assessing the condition of residual stands (trees > 5" dbh) immediately after logging is a necessity in predicting future stand potential.

There are four common types of damage associated with harvesting – root, stem, crown and soil, here listed in order of seriousness. Trees with no damage whatsoever insures the future prosperity of the stand.

Crown damage ensues when a tree that is cut falls into another tree breaking limbs or when a mechanical harvester is used and the operator breaks the limbs of other trees as the one just cut is swung into position. The broken limb no longer manufactures food for the tree and this hinders future growth. Another problem is that the injury site allows wood decay fungi and insects an entry route into the tree. Small twigs may heal without damage, but limbs two-inches or more in diameter seldom do.

Stem or bole damage occurs when a cut tree falls against one being left for the future, when equipment used in building roads hits trees injuring bark and sapwood, when logs being skidded to the landing bump standing trees and remove bark and when road building results in dirt piled around trees. All such damage is serious. The tree may not die, but even moderate trunk damage can degrade a tree from potential sawlog-quality to a pulp or cull status. Cutting and skidding, especially without careful advance planning, often creates serious problems for the future.

Root damage can cause stagheadness (crown damage) and extensive decay in the lower stem. Most of the smaller woody tree roots are usually in the upper 8-12 inches of soil where they are easily cut or crushed by machinery. This is the reason for suggesting that cables be pulled from the dozer or skidder remaining on skid roads to felled trees instead of backing the skidder or dozer off the road to them. Ruts caused by skidding on wet soil or “spinning” up too steep slopes are notorious for the damage they cause.

Site or soil damage is also caused when machinery compacts the soil. The ground pressure of equipment, especially on wet or thawing ground, should always be considered and limited to no more than 10 pounds per square inch. A pickup truck may have a ground pressure of 15 psi, twice that of a small bulldozer with a winch. Tracked feller-bunchers usually have a psi of seven or less, a tracked skidder seldom more than eight and an 8-wheeled forwarder no more than 10. In contrast, wheeled skidders mostly exert a pressure of from 12 to 15 psi. Thus, it is important to plan the roads in advance and to stay on them.

Light damage to a stem is when only one side of the tree has been hit and the damage does not penetrate the bark or when bark is removed from less than one-eighth of the stem's diameter. Heavy damage is when the bark is removed from at least one-quarter of the diameter and also when the sapwood is nicked as by a dozer blade. Moderate damage falls in between the light and heavy categories

Light crown damage is a scrape on a major branch, moderate is when up to 25% of the smaller branches have been slightly injured and heavy is when 12.5% or more of the major branches have been injured. Decapitated trees and trees from which limbs have been stripped from one or more sides of the crown are always considered as heavily damaged.

Light root damage is 6-inch or shallower ruts under a trees canopy that impact no more than 12.5% of the area. Moderate damage includes ruts deeper than six inches on up to one-quarter of the area between the trunk and the drip line and heavy is when more than 25% of the area within the trees drip line is rutted six inches or deeper.

How much damage is too much? Researchers who have written for the Forest Resources Association (formerly the American Pulpwood Association) believe that 10% damage is a worthy goal and that damage exceeding 25% in any partial harvest operation is unacceptable in northeastern hardwood stands. Inspection of several dozen log jobs in West Virginia indicates that the average damage by careful loggers is between 10 & 15% on marked sales and 18 to 25% on 16" dbh diameter limit sales. The difference seems to be in the volume left in the residual stand – 2,500 or more board feet in the former and 800 or less to 1,200 board feet in the latter. Any higher percentage of damage indicates undue carelessness by the logging crew and the forester in charge.

How can the damage be measured? Researchers for the Forest Resources Association suggest that a good sample is a one- percent systematic sample of the residual stand. The technique can vary, but ten-foot strips perpendicular to the skid trails are easy to lay out. They suggest carrying a five-foot stick and to alternately measure left and right of a compass line laid out on the map. Any tree that is within five-feet of the center line of the traverse is damage-rated and recorded. Both damaged and undamaged trees are counted. Each 4,356 feet of traverse equals one acre. A five-foot stick, compass, map, clipboard and a hip chain or well calibrated pace is all that is needed. The harvest area is measured and enough lines are laid out to get the suggested one-percent sample of the acreage in an unbiased way. Damage is usually concentrated near landings and dispersed near property boundaries; so both should be avoided as starting points. The FRA also suggests weighting the sample results, giving three for heavy, two for moderate and one for light damage.

Careless logging causing the damages listed above, may in combination with stand shock, offset the first 10 years or so of growth after the harvest.

The forester in charge of the sale can do much to prevent significant residual stand damage by flagging or helping the logger to flag road locations and by marking trees for harvest that might not be marked except for their location near a mature tree that will cause heavy damage to them when it is felled.

(Prepared by William H. Gillespie)

---

The Forest Resources Association publication 97-A-14, entitled Professional Mechanical Harvesting Practices contains an excellent chapter on residual stand damage. The 10-foot strip technique mentioned above is adapted from it. ((600 Jefferson Plaza, Suite 350, Rockville, MD 20852 \$20.00/nonmembers; \$10/members)

(Prepared by William H. Gillespie)

This publication is distributed free by the Timber Committee, West Virginia Forestry Association, P. O. Box 718, Ripley, WV 25271. Please call (304-372-1955) or write for additional copies, topics or for a list of speakers and their availability.