



Sustainable Forestry versus Diameter Limit Cutting

Cover photo: Long-term value is enhanced by allowing timber to reach financial maturity.

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Sustainable Forestry

Forest ownership carries an opportunity to practice sustainable forestry. In this sense, **sustainable** means managing the forest in such a way that it provides a continuous output of products and services, without causing lasting harm or affecting forest productivity (Schuler and McGill 2006). Sustainable forestry embraces “monitoring forest health ..., maintaining appropriate levels of stocking and structure, enhancing the growth and vigor of desirable species, and regenerating new trees and forests when the current ones reach maturity or no longer serve the landowners’ needs” (Kenefic and Nyland 2005). **Diameter limit cutting**, as described in this pamphlet, generally is counter to sustainable forestry.

Diameter Limit Cutting Defined

Diameter limit cutting (DLC) is the practice of harvesting all merchantable trees above a specified diameter (for instance 16 inches and larger in diameter). Diameter limit cutting is a form of **high-grading**. In forestry, “high-grading is the removal of the most commercially valuable trees (high-grade trees), often leaving a residual stand composed of trees of poor condition or species composition” (Helms 1998).



With DLC, trees such as this high-quality red oak (left) are harvested before reaching financial maturity. Whereas poor-quality trees (right) remain, leading to a degraded stand.

With DLC, timber diameter is measured either at 4.5 feet above the ground level (referred to as diameter at breast height or DBH) or at stump height. The diameter is normally selected based on tradition, financial needs, tree species, the cost of harvesting, ease of implementation and local sawmill demand. **In most cases, however, DLC does not remove undesirable species, culls, or poor-grade trees that fall within the specified diameter limit. Nor does DLC harvest the smaller unacceptable trees with diameters below the specified diameter limit.** Such trees have little investment value and should be removed to promote stand improvement. What DLC does do is sacrifice immature, desirable crop trees before they reach financial maturity — trees, which if left to grow, could develop into high-quality, top-value timber, desirable to the hardwood industry. It is these shortcomings of DLC that challenges sustainable forestry.



A failure of DLC is that the undesirable and/or defective trees that fall below the harvest parameters are not harvested. This fire-damaged red oak is an example of a residual tree that should have been removed (or deadened) for stand improvement.

For the purpose of this publication, timber is considered “financially mature” when its continued value increase is below what the owner can earn in a comparable, alternative investment

Why Does DLC Happen? The Pros and Cons

Diameter limit cutting occurs for the following reasons:

- 1) High Initial Revenues** — Diameter limit cutting liquidates more timber assets upfront and improves current revenue, but it compromises long-term financial gain from future timber sales (Nyland 2006). Merchantable hardwood timber broadly falls into three categories, including pulpwood (6-11.9 inches DBH), small sawtimber (12-17.9 inches DBH), and large sawtimber (18-plus inches DBH). Market value generally increases as timber size increases, yet DLC often removes desirable small sawtimber. Although small sawtimber can be sold with DLC to increase current income, such timber often is financially immature. If left to grow, particularly if good quality, small sawtimber can gain substantial value as an investment.

2) Ease of Application — When harvests are in the planning stage and parameters are being set, DLC is simple to understand and cutting specifications and terms are easily settled upon. Landowners and their loggers must agree on the property boundary, size and species of trees to be harvested, and the price per unit. Once these are set, cutting begins. With DLC, professional foresters are normally not involved in planning the timber harvest — i.e., evaluating the stand and its regeneration prospects, prescribing a properly marked



*Size (diameter) is only one criteria used when determining if a tree is financially mature — **species, site quality and tree condition** are other criteria to consider. The red oak (right) is financially mature and should be harvested. However, even though it is much smaller, the red maple to the left is also financially mature. With DLC, the red maple would fall below harvest criteria and would be left.*

In sustainable forestry, hardwood trees are allowed to reach financial maturity before harvest. Here the red oak is marked for harvest, and in so doing, the white oak (left) will be released to continue growing.

harvest, and ensuring that sustainable forestry is being practiced.

3) Value System — Diameter limit cutting is a common alternative to clearcutting. Timber stands are sometimes in poor condition due to previous mismanagement. In such cases, an accepted practice is to harvest all trees in an effort to regenerate a more desirable stand. This is clearcutting, and for some, clearcutting is undesirable due to ownership values and alternative objectives, such as recreation and aesthetics. Diameter limit cutting often becomes the default to clearcutting in these cases.

4) Tradition — Diameter limit cutting has endured through time. It is perpetuated with a common misconception that smaller trees left as residuals are younger, and that harvesting the larger (assumed to be older) trees will provide the smaller (assumed to be younger) ones room to grow. In many cases, the smaller trees are the same (or nearly the same) age as their larger counterparts (Clatterbuck 2004). Slow-growing, poor-quality residual trees rarely become future champions. With each successive diameter limit cut, the ability of a forest to “earn its keep” is diminished.



This stand has already gone through one rehabilitation harvest and will soon be ready for another.

Forest Management Options Following One or More Diameter Limit Harvests

Landowners and forest practitioners are regularly faced with decisions on how to manage timber stands once “the damage has been done,” i.e., forest stands have undergone DLC (or many occurrences of DLC). Proper forest management is highly dependent upon the availability of acceptable growing stock (AGS) within the stand. Here AGS refers to trees meeting specified objectives of species, quality, vigor and value. As outlined in UT Extension publication PB 680 “*Treatments for Improving Degraded Hardwood Stands*” (Clatterbuck 2006) extension.tennessee.edu/publications/Documents/SP680.pdf, two options exist for degraded stands: rehabilitation or regeneration.

Where sufficient acceptable growing stock exists, stands can be **rehabilitated** (improved) via sanitation harvesting, crop tree release or pre-commercial timber stand improvement. With these practices, undesirable trees are either harvested or deadened in an effort to create adequate growing space for the desirable (AGS) trees. If a market cannot be located for the undesirable trees, they can be deadened by girdling and/or with herbicide treatment. Cost-share assistance is sometimes available from both the state and federal governments to offset investments in deadening undesirable trees.



Sustainable forestry and patience produces top-quality, high-value trees such as these veneer white oaks.

Alternatively, when the growing stock is so poor that stand continuation is not economically viable (a decision that should involve assessment by a professional forester), stand **regeneration** is the preferred option. Regeneration is the act of starting (or reproducing) a new forest, and it can occur in a variety of ways, including clearcutting, patch openings (small clearcuts), shelterwood or planting. With these techniques, new seedlings are released, invade or are planted to occupy growing space, eventually becoming a viable stand. Southern hardwood forests are difficult to sustain with continuous partial harvesting. Doing so favors the reproduction of shade tolerant species, generally viewed as less desirable.

Regeneration of many of the more desired species (oaks, tulip poplar) requires that at some point, a heavier, stand initiating harvest is needed — thereby allowing adequate sunlight to reach the forest floor and encourage seedling development.

Is DLC Ever Appropriate?

Although DLC is generally counter to sustainable forestry, there is occasion for its application. An example is woodlands having two distinct age classes, whereby the overstory timber (1st age class) is clearly mature or is of very poor quality. The understory timber (2nd age class) may have desirable qualities, but its growth is being suppressed by the overstory. In such cases, when the two age classes are clearly distinguishable, DLC can be prescribed, thereby gaining the value of the overstory timber while releasing the understory timber. However, this harvesting practice can lead to considerable damage to the residual understory trees. Professional assistance is recommended.

Closing Remarks

Diameter limit cutting has been practiced for generations, is simple to implement, and can provide favorable short-term financial returns. However, DLC usually leaves a degraded forest. This runs counter to sustainable forestry. With DLC, trees with highest current value are harvested, leaving slow-growing, undesirable and/or poor-quality trees behind. Stand growth, yield and future timber sale incomes are compromised.

This pamphlet creates awareness of the problems of DLC with intent to reduce the implementation of this practice. Before a commercial timber harvest is conducted, landowners are advised to first seek assistance from professional foresters. With the forester's knowledge, a plan can be developed that will not only avoid DLC, but reverse the deleterious effects.

For more information about sustainable forestry, including acceptable methods of timber harvesting, contact your local Tennessee Department of Agriculture Division of Forestry forester or University of Tennessee Extension county agent.

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