

CLASSIFYING YOUR HARDWOOD TIMBER FOR HARVEST PURPOSES

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For most forest landowners, the opportunity to harvest their hardwood trees doesn't happen often. Species such as oak, hickory, maple, poplar, cherry and others require decades to reach financial maturity. Waiting for the crop to mature requires patience. When the time arrives, knowing which trees to harvest and which to retain for future revenue can be challenging.

Timber harvesting typically occurs either to thin immature stands (often called a partial harvest or thinning), or to regenerate mature stands (usually called a clearcut harvest). This publication focuses on partial harvesting, specifically how to determine which timber to liquidate and which to hold for future timber sales.

Taking Stock

Putnam et al. (1960) developed four classes of timber to aid foresters and landowners with the decision of identifying timber either for harvest or for retention. Putnam's four timber classes were established with timber production as the primary goal, although the categories could be modified to suit wildlife, aesthetic or other goals. The four classes are: cutting stock, preferred growing stock, reserve growing stock, and cull stock. Putnam's work has since been updated (Meadows and Skojak 2008), and the modifications are addressed later in this publication.

Understanding of the term **growing stock** is central to following the Putnam model. Think of growing stock as timber found in the forest that is not to be harvested at the moment but is being held over either for future harvest or to protect and enhance other timber that is intended for future harvest. In a broad sense, growing stock is either acceptable or unacceptable based on species composition, maturity, health, form, grade and/or in the ability to reach landowner goals.

In addition, to better understand this publication, the phrase timber stocking must also be explained. As defined in A Glossary of Common Forestry Terms (Mercker 2017) (extension.tennessee.edu/publications/Documents/W428.pdf), stocking is a relative term indicating the amount of growing space being occupied by trees and the amount of growing space that is available or unoccupied. Although stocking cannot be directly measured, collective factors contributing to stocking guides include: basal area per acre, number of trees per acre and average tree diameter. Relative terms, such as overstocked, fully stocked or understocked, are descriptive language describing stocking. For best stand growth, stocking should be maintained in the fully stocked range.

Overstocked – A stand that is overcrowded, beyond 100 percent stocking, thus reducing tree growth and vigor.

Fully stocked – A stand where trees effectively occupy most of the growing space, yet some space remains for further crown expansion and growth of developing crop trees. For example, a stand fully stocked at 70 percent can grow suitably until reaching 100 percent stocking.

Understocked – A stand in which crop trees do not fully occupy the growing space, thus stand growth is not maximized. Tree form or grade may be compromised. For example, a stand of trees that remains following a heavy diameter limit cutting might be understocked.

The concept of forest stocking is complex, and it is advised to work with a professional forester for a more thorough understanding and implementation. The profession of forestry developed tables for measuring adequate forest stocking, and foresters are familiar with the tables.

Cutting Stock

Cutting stock is timber that is ready for harvest. Such trees are not likely to increase in value and may even decline if retained for future harvest. Meadows and Goelz (1999) summarize cutting stock as trees that "... may be in poor condition, may pose a significant risk of mortality or degrade in merchantability, or may be of a species that is unsuitable for the site or for management objectives. This class includes trees that are over-mature, damaged, diseased, poorly formed or otherwise undesirable. They are likely to die or to suffer significant decay or degrade in the near future and are, therefore, expected to decrease in value if left after partial cutting."

An example of cutting stock could include a large-diameter oak with top branches beginning to senesce. It could also include any species with poor/crooked form, full of defects, and growing adjacent to and hindering a tree classed as preferred growing stock.



*These two white oaks qualify as **cutting stock** because they have reached financial maturity.*

Preferred Growing Stock

Timber that is not yet chosen for harvest, but has a very good potential for future harvest, is termed preferred growing stock. These trees are healthy and growing vigorously, are of desirable species, with good form and grade, and have strong crown position with little risk of dying. Preferred stock is increasing in value steadily (or even exponentially) and is therefore left for a future cutting.

An example of preferred growing stock could include high-quality 12- to 20-inch oak trees (measured as diameter at breast height, or dbh) growing on a desirable site, with outstanding form and grade, and having a favorable crown position (dominant or codominant). These are the favorable investments. With sound management and the absence of disturbance, such trees can produce promising financial returns.



*This 18" dbh cherrybark oak tree is classed as **preferred growing stock** because it is a desirable species, has good form and grade, and is in dominant crown position.*

Reserve Growing Stock

Reserve growing stock includes timber that is not to be harvested right now and is generally in good condition, but for various reasons does not meet landowner objectives. Such timber may have lower market value due to being an undesirable species, or having poor form and/or grade. Reserve growing stock may be needed to maintain proper stand stocking for continued development of the preferred growing stock and is therefore retained.

An example of reserve growing stock could include a generally undesirable sycamore, beech or sweetgum tree, or a poor-quality desirable species, that is retained to maintain proper forest stocking in order to protect the preferred growing stock. Such trees generally do not meet landowner objectives.



*Although this Yellow-poplar is a desired species and has average quality form, it is classed as **reserve growing stock** because of the high number of defects (knots and limbs). It has been retained rather than being cut because if removed, there are no preferred growing stock trees nearby to release.*

Cull Stock

Timber that has declined to the point that it cannot meet management objectives, and is not needed to maintain desired stocking, is classified as cull stock. A cull is a tree of merchantable size that, because of defect, is mostly useless for the intended purpose of timber production. Sound cull stock might have some usable wood, and therefore may be harvested for lower value products such as pallets, pulpwood or firewood. Unsound culls have no value for wood production. When cull stock cannot be salvaged, often the decision is either to deaden it (in a timber stand improvement project) or, if not too abundant, retain some for wildlife value (particularly if den holes are present).

An example of cull stock might include timber with interiors that have become excessively hollow due to repetitive ground fire. Trees with excessive branching, cupping and rot are other examples.



*This red oak was previously severely damaged either by equipment or fire, causing the tree to become hollow and is classed as **cull stock**. The tree could either be deadened or left for wildlife.*

Which Trees Should be Selected for Sale?

Once a landowner and a forester have made a general assessment of a stand of timber, the duty of selecting trees for harvest can begin. Clatterbuck (2007) makes the following recommendations for determining which trees to cut vs. leave:

- Harvest all cutting stock and cull stock trees unless the retention of some is needed for visual or wildlife values.
- To enhance future timber sale incomes, few (if any) preferred growing stock trees should be harvested. An exception might be when an impending threat exists (e.g., insects or disease such as the Emerald Ash Borer). Also, on occasion, some preferred growing stock might be harvested if found growing adjacent to another preferred growing stock, and additional space is needed for crown development. Further, a temporary spike in market prices may justify harvesting preferred growing stock.
- Reserve growing stock may either be harvested or left to grow. Often reserve stock is retained in order to maintain adequate stocking around preferred growing stock trees. Sometimes, however, including some reserve growing stock to enrich a timber sale that is otherwise heavily composed of less desirable cutting stock and cull stock may make a timber sale more attractive to potential buyers.

A Caution of What *Not* To Do

For lack of knowing what to do, many forest landowners resort to the historical (and unacceptable) practices of high-grading and diameter limit cutting. Both are deleterious to the goal of timber production. As defined in *A Glossary of Common Forestry Terms* (Mercker 2017), **high-grading** is a harvesting technique that removes only the best, most valuable trees to obtain high, short-term financial returns at the expense of reducing future growth and revenue potential. In other words, “harvest the best and leave the rest.” **Diameter limit cutting** (DLC) is a harvest based on cutting all trees in a stand above a specified diameter (e.g., 16-inch dbh and larger), regardless of tree vigor, species or spatial distribution. Like high-grading, DLC usually results in long-term degradation of the stand. For more information on DLC, refer to Sustainable Forestry versus Diameter Limit Cutting (Mercker 2016) [extension.tennessee.edu/publications/Documents/PB1848.pdf](https://www.extension.tennessee.edu/publications/Documents/PB1848.pdf).

A Variation of the Classification System

As described here, Putnam’s system is designed to provide a general guideline for assisting in implementing partial cuttings in Southern hardwood forests. It is not a flawless system. Among the observations of Putnam’s system, Meadows and Skojac (2008) suggest that the reserve growing stock class is too broad and poorly defined, and, when applied in the field, practitioners can have difficulty maintaining the target residual density uniformly across the stand.

Instead, Meadows and Skojac divided the preferred and reserve growing systems, and then devised five classes used only for sawtimber-sized trees: 1) preferred growing stock, 2) desirable growing stock, 3) acceptable growing stock, 4) cutting stock, and 5) cull stock. Further, with the slightly smaller (and generally younger) pole timber-sized trees, they suggest two classes: 1) superior pole timber stock and 2) inferior pole timber stock. For more information on the revised system, see: www.srs.fs.usda.gov/pubs/30338.

Conclusion

Private forest landowners are encouraged to work with professional foresters when considering selling timber. Determining which trees to harvest and which to retain is complicated. Foresters are trained to understand the various aspects of silviculture and forest management. To find a professional forester in Tennessee, refer to the following sites:

Tennessee Division of Forestry Area Foresters

www.tn.gov/agriculture/forests/staff.html

Consulting Forester Directory

www.tn.gov/agriculture/forests/landowners/consulting-foresters.html

Additional Images



Obvious **cull stock** with no lumber value but an excellent wildlife den tree.



A fine example of **preferred growing stock**, this 18" dbh northern red oak has all the qualities for a tree that should be retained for future timber sale.



Not only has this white oak reached financial maturity, but a recent lightning strike further qualifies it as **cutting stock**.



Both of these trees are classed as **cutting stock**—the northern red oak to the right is financially mature while the red maple is not a species that meets the landownership objectives and should be cut.



The southern red oak to the right is **cutting stock**. The white oak (left) is **preferred growing stock** and will be retained for a future timber sale.



An American elm tree classed as **cutting stock**, for three reasons: undesirable species, has reached a large diameter, and has very poor form (multiple forks).



This 24" dbh white oak is **cutting stock**. It is financially mature and has numerous limb knots that won't improve with additional growth.



With this example, the 18" dbh cherrybark oak to the right is **preferred growing stock**. The 12" dbh sweetgum to the left could be classed either as **reserve growing stock** or, if competing with the oak crown, could be removed as **cutting stock** to release the oak crown for improved growth rate.



A tree classed as **cull stock**. It has a hollow trunk, is also hollow at the sharp bend near the top, and has an excessive number of large knots.



The cherrybark oak trees marked with orange paint all qualify as **preferred growing stock**: desired species, good form and grade, strong crown position, and well-spaced.



The two (darker colored bark) red oaks in this photo are all **cutting stock**. The site is very dry and the red oak are succumbing to hypoxylon canker. Most of the white oaks could be retained for a future timber sale. Some are classed as **preferred growing stock**, while others are **reserve growing stock**.



These two sycamores are **reserve growing stock** and are retained because there were no preferred growing stock trees nearby to release; i.e., no benefit could be derived by cutting them, so they were retained for the next harvest.



*These photos occur on the same site and where taken 15 years apart. The left photo was taken immediately following a partial timber harvest and the two red oaks were retained as **preferred growing stock**. In the right photo, the same two trees advanced to **cutting stock** because they grew and reached financial maturity.*

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