

# SELECTIVE HARVESTING

## PART ONE: SUSTAINABLE MANAGEMENT OR HIGH-GRADING?

by Jeff Stringer

*Note: This is the first of a two-part series that explores the sustainability of selective harvesting. The first part outlines the difference between a sustainable selective harvest and a high-grading, which is a form of selective harvesting most prevalent in Kentucky. The second part of this series outlines how to determine if your timber marking strategy is sustainable and part of a good long-term management strategy.*

Most woodland owners are averse to harvesting a large percentage of their overstory trees. Because of the drastic change in aesthetics and the issues that arise from very intensive harvests over entire woodlands, many owners prefer the idea of a selective harvest. Unfortunately, the term selective harvest is almost meaningless. In essence, it means that not all of the trees will be cut. However, it does not indicate what species, size, number, or quality of tree is to be left. Because of this vagueness, it is not a term normally used by foresters in technical discussions. When

responding to the question, “If you had one word to describe to landowners the type of harvesting you do, what would it be?” more than 1,400 loggers in the Kentucky Master Logger program overwhelmingly used the term selective. Upon deeper enquiry, it was found that this meant everything from a commercial clearcut, where only small or unmerchantable trees are left, to a high-grade where only the best trees are removed.

So the question “Is selective harvesting good or bad?” is an important one, and the answer needs to be thoroughly understood if woodland owners are to make good decisions about developing a timber harvest that ensures long-term sustainability.

One of the biggest plagues to sustainable hardwood timber production is high-grading. This practice is often done under the banner of a selective harvest. High-grading is defined as a harvest that removes only high quality and value trees while leaving lower quality trees to occupy valuable growing space. When high-grading occurs several times to a stand, it can result in a long-term loss of value that is hard to regain.

*This woodland was just harvested as part of a thinning to improve quality hardwood production. Note the many straight undamaged trees and the limited amount of ground disturbance, tops, and debris. This is an excellent example of a controlled selective harvest. Lower left image: Harvester used to thin this hardwood stand. Photos courtesy: Jeff Stringer*







*Once high quality trees are mature they need to be harvested to maximize timber revenues. Note that the tree being cut is marked and this harvest was designed to carefully remove the mature sawtimber trees and low grade trees to ensure room for good growing stock.*

and few markets for lower grade trees. If your hardwood forest is selectively cut based on markets for grade sawlogs only, there is an extremely good chance that the harvest is a high-grading. A study in Kentucky indicated that approximately 60 percent of the harvests occurring during the late 1990s were high-gradings (see Figure 1). This situation is not uncommon for hardwood forests in many states in the East. Unfortunately, repeated high-grading has been shown to reduce the standing value of hardwood forests to approximately one-fourth to one-tenth of the potential value that could be obtained through the use of silviculturally sound harvesting practices. Since the initial harvest of the state's hardwood forests, limited or nonexistent markets for low-valued hardwoods have resulted in second and third cuts that were high-grades. While the development of low grade hardwood markets have helped reduce high-grading, the practice is still common.

It remains common in Kentucky because economics and to some degree tradition, push loggers and landowners to high-grading. In some areas, the only strong markets that exist locally are for quality sawtimber logs. In this case, true economics are driving high-grading. In some instances high-grading is done because individual timber buyers and/or loggers have traditionally cut high quality trees and have developed their operations to efficiently harvest and market only high quality logs. In these cases their ability to efficiently harvest lower quality trees is limited. Some loggers have learned to harvest lower grade material. This is accomplished either by improving their ability to harvest large quantities of low quality wood for markets such as pulpwood or by processing the low grade material themselves into a value added product. In some instances loggers have developed reduced overhead costs that allow them to live with the lower profit margin associated with harvesting and selling low grade logs. Even in bottomlands, where highly mechanized logging operations are possible, high-grading, under the guise of selective cutting, is still common. In many cases, many landowners yield to economic pressures associated with high-grading and "mine" the current and future growth of high-quality trees from their lands. Unfortunately, there are few forests that can withstand repeated high-grading.

### **Problems with High-Grading**

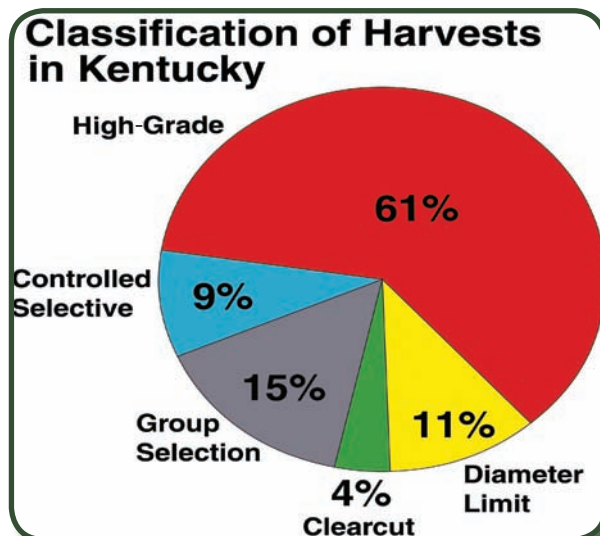
High-grading has several harmful effects. First, it removes the better quality stems, leaving growing space to be occupied by poorly formed trees or species of low timber value.

Second, high-grading, like any type of light selective cut, limits the amount of sunlight reaching the forest floor, resulting in the long-term development of regeneration from shade-tolerant species such as red and

Generally, high-grading is regarded as the fastest way to ruin the sustainability of a hardwood forest.

A diameter-limit harvest is also a type of selective harvest. In this type of harvest, only trees above a specified diameter are cut. A large majority of landowners and loggers believe that diameter-limit harvests are the best in the long run for hardwood stands. This perception is common because many believe that the small diameter trees are younger and will eventually grow into large, valuable trees. This may or may not be the case (see discussion on size and age below). If a diameter-limit cut results in only small, old, low vigor and low quality trees being left, this type of harvest is as unsustainable as high-grading and it is not uncommon for high-grading and diameter-limit cutting to be categorized together as unsustainable practices. There are instances where trained foresters can prescribe a diameter-limit harvest that will improve woodlands, but only if enough young, vigorous, and potentially high valued trees are present and can be left undamaged after harvest of the larger trees.

Unfortunately, the practice of high-grading is widespread and results from readily available markets for high-quality grade sawlog and veneer trees



*Figure 1. Timber harvest classification in Kentucky.*

sugar maple, American beech, and various species of hickory. Even though there is nothing inherently wrong with these species, their presence reduces the successful regeneration of species needing full or moderate sunlight to regenerate and grow vigorously such as oak, ash, walnut, and yellow-poplar.

A third problem results from the perpetuation of small, old, low-vigor trees. Often smaller trees are left, with the idea that these trees are young and can grow rapidly into sawtimber-sized trees. In fact, small sapling to pole-sized trees in many hardwood stands are close to the age of the large overstory trees and cannot be relied upon to respond successfully to increased growing space after a harvest. Leaving these small but old trees further reduces the volume and quality yield of the forest.

Finally, the repeated entry at 10- to 20-year intervals that is typically associated with high-grading can be detrimental to the stem form of regenerating trees, especially if a limited number are present. High-graded forests are thus degraded, not only through the reduction of a valuable overstory but through a loss of valuable regeneration. Figure 2 shows the effect of repeated high-grading on a typical hardwood forest initially stocked with a high quality overstory of oaks and yellow-poplar.

### Options to High-Grading

What can be done? One obvious remedy to break the cycle of repeated high-grading is to use a type of silvicultural system and harvest that initiates generation of a new age class that is capable of growing into high-quality, valuable trees.

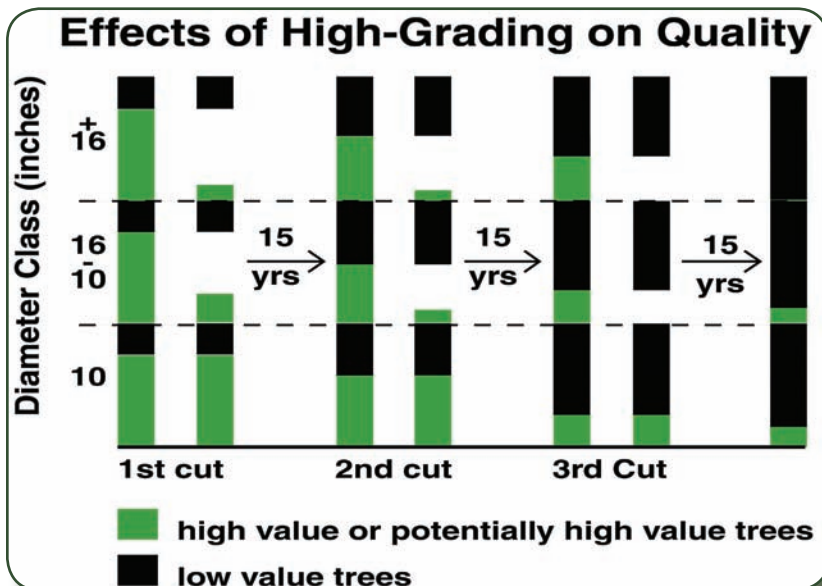


Figure 2. This diagram shows the adverse effect of high-grading on stand quality and value. In this example, the initial stand is composed of a large number of high-quality or potentially high-quality trees in all size classes as indicated by green segments in the first bar. When the first high-grading occurs, the majority of the valuable trees greater than 16 inches are removed as well as the better-quality medium-diameter trees 10 to 16 inches in size. The remaining high-quality trees as well as the low-quality trees grow in volume until the next high-grading. However, the percentage of high-quality trees is less in 15 years than was initially present. Unfortunately, due to the shade on the forest floor and damage to the regeneration, the forest is not able to develop potentially high-value regeneration that is able to replenish the overstory. This cycle is repeated until both the overstory and the regeneration are dominated by poorly formed stems or species of low value resulting in a highly degraded forest.

In situations where high-grading has left an entire stand or woodlands significantly degraded, clearcutting or a similar treatment can be recommended. However, there are many cases when the use of clearcutting is not an option.

If selective harvests are to be attempted, it is imperative that a forester be employed to develop a harvest that is not exploitive. Analysis of the woodlands will determine the age and size of quality trees in the stand and the status of the regeneration, and those factors will indicate the type of silviculturally based harvest that is needed. For example, group selection, small patch, a two-age deferment harvest, or a shelterwood harvest might be prescribed if regeneration within the stand is needed. If regeneration is not required, the forester will prescribe an improvement harvest ensuring that a significant amount of lower-quality material will be marked for harvest along with any good quality mature timber. This job can be difficult in stands that have been degraded and where limited markets for low-grade timber exist. Regardless, a professional forester is required to prescribe and mark successful harvests. Without a professional forester's assistance, selective cutting in many of our hardwood stands can easily result in degrading and a loss of sustainability.

#### About the Author:

Jeff Stringer, Ph.D. is a hardwood extension specialist at the University of Kentucky and is responsible for continuing education and research in hardwood silviculture and forest operations. He is also an editor of the Kentucky Woodlands Magazine.

Cooperative Extension Service, Department of Forestry, University of Kentucky, 213 Thomas Poe Cooper Building, Lexington, KY 40546-0073; E-mail: stringer@uky.edu; Phone: 859.257.5994; Fax: 859.323.1031.