Purdue University
Forestry and Natural Resources
Timber Processing

Buck Your Logs To NHLA Rules?

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The National Hardwood Lumber Association grading rules for factory lumber determines how the industry saws, edges, trims, packages, and sells its product. They represent the one voluntary rule to which virtually all grade mills subscribe. Why shouldn't these rules also help determine how individual logs are bucked, that is, from the tree stem? Lumber grade is the ultimate determinate of value, not log grades and log scale.

Size Recommendations

When sawing for FAS or FAS One Face lumber, the sawyer opens each log face to a minimum 6-inch width required for these grades. Figure 1 shows the clear lengths needed or defective "feet to lose" in order for a 6-inch wide board to grade FAS. For 6-inch wide lumber, these lengths must be contiguous through 14 feet. A 16-foot length will allow two cuts, each at least 5 feet long but totaling 13 1/3 feet. As the sawyer cuts deeper, the boards become wider. Wider boards allow more cuttings thus making it easier to grade FAS. However, as the sawyer cuts deeper, the probability of more defects showing up, especially those which were not visible on the surface, greatly increases. Thus, for average timber where only a few high-grade boards are expected from each log face, it is probably best to base log cutting length decisions on a 6-inch wide board.

Table 1. Estimated lumber value in dollars for three logs bucked at different locations for the same northern red oak stem.

	Method 1	Method 2	
Butt Log	$133	$159	
2nd Log	$129	$122	
3rd Log	$ 72	$ 72	
Total	$333	$360	
Difference			$27

Dollar Value of Lumber Bucking Decisions

The following are three examples of how bucking decisions can affect the value of lumber produced from a tree stem. In order to place dollar values on different bucking options, the resulting logs were graded using the Forest Service hardwood log grading system (Kenna, 1981) and lumber grade yields (Hanks et. al, 1980). The grade yields are given in percentages. Each log was scaled using the Doyle Rule and 20 percent was added for overrun. The red oak lumber values used were from the February 9, 2001 issue of the *Weekly Hardwood Review*. The prices are as follows:

Select and Better	$1,200 / MBF
No. 1 Common	$765 / MBF
No. 2 Common	$525 / MBF
No. 3A Common	$440 / MBF
Other	$250 / MBF

Figure 2 shows one face of a tree stem with just two different bucking options analyzed. The difference in lumber value between the two options is about $27 (Table 1). How can just two quick cuts with a chainsaw make such a difference?

Figure 2, line 1, and Table 1 show that a 10 foot, 18 inch diameter inside bark (DIB), clear butt log could be cut with an estimated lumber value of $133. The next log is then likely to be 16 inches DIB and cut at 16 feet or shorter. If cut at an unlikely 14 2/3 feet in length (3 feet of defective material plus 11 feet and 8 inches of clear length), the log will barely grade a Forest Service No. 1 and yield $129 in lumber value. A short top section of 1 foot and 7 inches ends up in the pallet grade material. If the log is cut at 16 feet, it will grade a Forest Service No. 2; and because of increased volume, it will yield $129 in

lumber value. For a 16 foot 6 inch wide FAS board, 13 1/3 feet are required to be clear. The log will not yield this length. For a 14 foot 6 inch wide FAS board, 11 2/3 feet are required to be clear. If the log is cut with 8 inches of over-length and the board properly end-trimmed (an unlikely set of circumstances), the mill might produce the FAS board. It is more likely that the board will need to be cut back with resulting volume loss to yield FAS.

Figure 1. Clear lengths needed and "feet to lose" by log length.

Clear Lengths Needed	Feet to Lose
6 2/3' needed Board Length - 8'	1-1/3'
8 1/3' needed Board Length - 10'	1-2/3'
10' needed Board Length - 12'	2.00'
11-2/3' needed Board Length - 14'	2-1/3'
13-1/3' needed Board Length - 16'	2-2/3'

The above lengths are calculated based on the NHLA Hardwood Grading Rules (1998) for a 6-inch wide board to grade FAS. The use of an additional cut for boards with 6 to 15 feet of surface measure is not considered. This rule allows two cuttings in the 12- and 14-foot length and 3 cuttings in the 16-foot length providing increased yield can be obtained from the board. Thus, in longer logs, defects can be placed in the middle as well as ends of the logs.

Figure 2, line 2 shows the second and preferred way to buck the two grade logs. A 12 foot 3 inch butt log with defects on the top end and estimated to produce 177 board feet of lumber worth $159 could be cut. If the second log is cut 14 feet 3 inches in length leaving limited defects on each end, it will produce 151 board feet of lumber valued at $129. There should be no problem in getting an FAS board from the second log produced in this fashion. Both logs will grade Forest Service No. 1. This combination produces an additional $27 in lumber value and maximizes the volume of grade lumber produced, as compared to the first and probably most common method where a clear butt log is produced.

Cutting Decisions

The increase in lumber value clearly results from placing the knotty material at the ends of the clear wood and the increasing volume in the butt log.

The lumber grades allow for a certain portion of each board to contain non-clear or defective wood. Producing a 12-foot butt log allows the mill the opportunity to produce at least one top grade board that contains as much non-clear wood as possible. If the log face does not cut as expected, the mill still has the opportunity to cut the 12-foot piece back to a 10-foot board.

If the 3 feet of knotty material between the butt log and the second log is to be utilized, it is unlikely that the second log can be made to produce a 6-inch wide FAS board unless a portion of the defective material is included in the butt cut or it's discarded or, more of the second log can be included in the pallet log.

The top log is pallet stock, thus its value does not change.

Figure 2. Maximizing lumber value through proper log bucking.

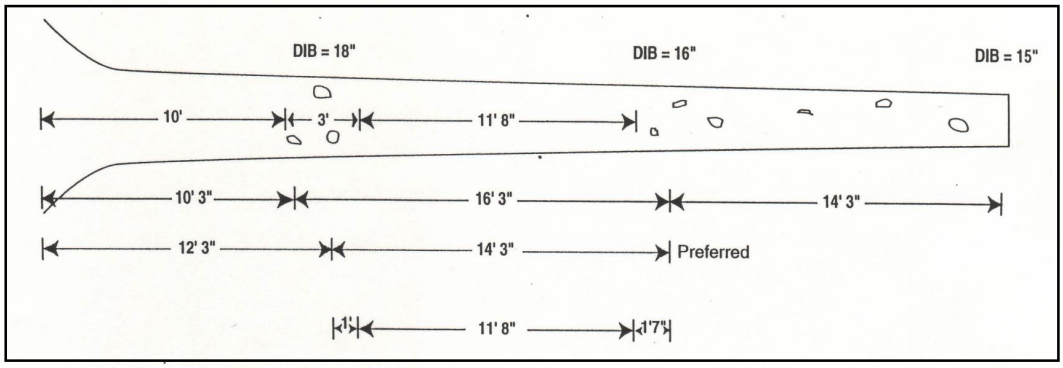


Figure 3 shows a second example of how seemingly minor differences in bucking locations can make important differences in the total value of the lumber produced. This example is for a somewhat smaller stem with numerous and more scattered defects. However, there are a couple of clear areas between the defects. In the first example, the stem was bucked through one of these clear areas resulting in two Grade 3 top logs. Moving the saw cut just two feet and cutting through a pair of knots results in a Grade 2 second log. The value of lumber increases from $199 for the first scenario to $208 for the second scenario, or a gain of $9.

Figure 4 is another example of the differences that can result from different bucking decisions. This example may also be a more controversial one. This is a little larger tree with rot in the butt section. Mills often tell loggers to buck off any rot or other defective areas. To avoid all possible rot, an 8-foot section was removed before the remainder of the stem was cut into two Grade 2 logs with a lumber value of $200.

With the second method, a portion of the rot was included in the butt log. This resulted in using four feet of good clear wood on the outside of the stem. With this downward shift in saw lines, Grade 1, 2, and 3 logs with a lumber value of $299 were produced representing an increase of $105. This significant increase results because of the extra clear lumber produced from the outside of the bottom portion of the butt log and from again shifting the saw cut from the center portion of a clear area to a defect.

Summary

If this approach is effective only a small percentage of the time, log bucking based on NHLA lumber grades could contribute substantial revenue to the mill. Coupling this idea with other good logging practices such as low stumps, complete utilization of the stem and major forks, limited jump butting, cutting all trees and good bucking, such as eliminating severe sweep and crook, removing large knots, butt and croch flare, and others could result in a substantial higher value received for any given tract or lot of timber.

However, it is important that the mill communicate its ideas with logging crews. Individuals making bucking decisions should know and understand the hardwood lumber grading rules. He should see boards beneath the bark and not logs or trees. Production employees can be taught basic lumber grading rules and various rules of thumb in a day or less. Independent crews must be compensated for logs bucked to maximize lumber value yield and not for the increased volume in short logs or for an irrelevant log grading system.

Figure 3. Maximizing lumber value through proper log bucking.

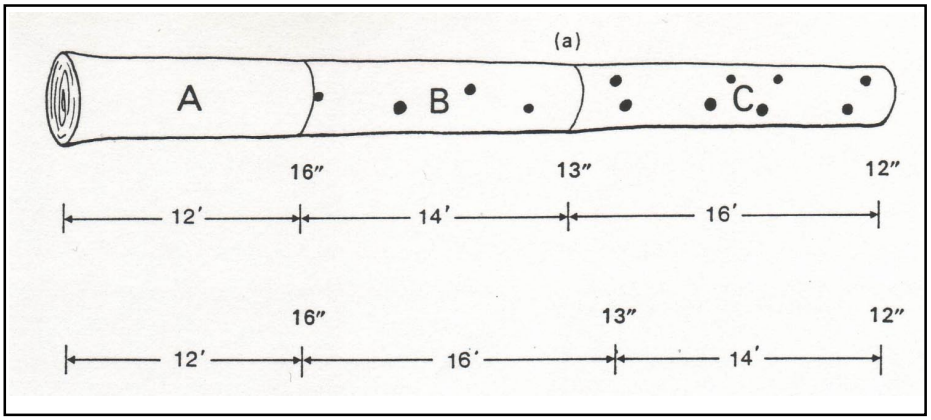
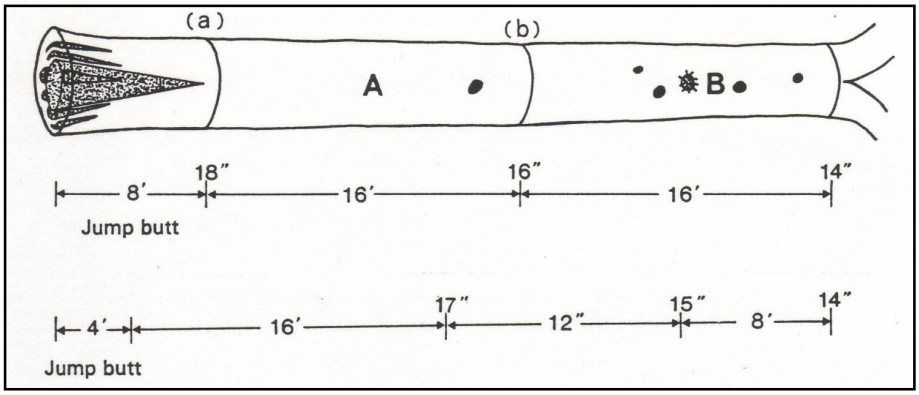


Figure 4. Maximizing lumber value through proper log bucking.



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