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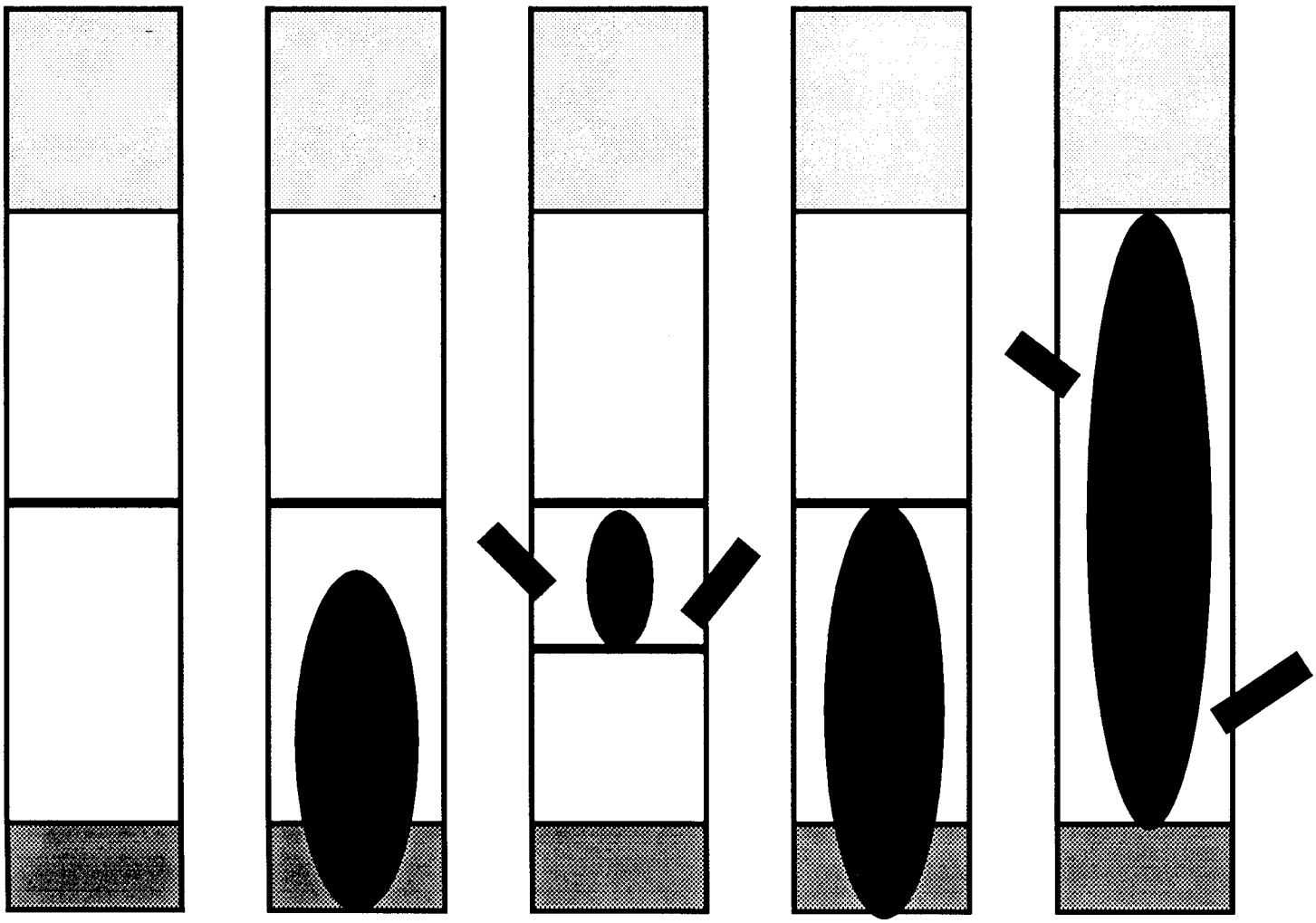
New Tree-Classification System Used by the Southern Forest Inventory and Analysis Unit

Dennis M. May, John S. Vissage, and D. Vince Few



SUMMARY

Trees on USDA Forest Service, Southern Forest Inventory and Analysis, sample locations are classified as growing stock or cull on the basis of their ability to produce sawlogs. A new tree-classification system is described and contrasted with the old system. Inventory data from the recently completed survey of north Alabama are used to illustrate the impacts of the new system on the reporting of tree volumes. The new tree-classification system provides a better means of determining a tree's class and ability to produce sawlogs and is consistent with the old system and compatible with the systems employed by other eastern Forest Inventory and Analysis units.

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INTRODUCTION

The USDA Forest Service, Southern Forest Inventory and Analysis unit (SOFIA), conducts continuing surveys of the forest resources in seven Midsouth States (Alabama, Arkansas, Louisiana, Mississippi, Oklahoma, Tennessee, and Texas). Data are collected at permanent sample locations spaced across each State on a 3- by 3-mile grid, and the extent, condition, and growth of each States's forest resources are tracked and reported. Trees at these sample locations are classified as growing stock or cull, based on their ability to produce sawlogs. Growing-stock trees—those with the potential to produce sawlogs meeting minimum size, grade, and soundness requirements—form the basis for most of the standard inventory statistics, such as growing-stock and board-foot volumes, reported by SOFIA. If users are to understand these inventory statistics, they must first understand the new SOFIA tree-classification system.

TREE CLASSIFICATION

Prior to the 1988 Arkansas survey, a tree was classified as growing stock and assigned a tree-class code of 20 if a 12-foot log meeting minimum grade and size requirements (Hanks 1976, Rast and others 1973) and regional standards for freedom from defect could be produced from the butt 16 feet of the tree (fig. 1). Any tree not meeting the growing-stock standards was classed as either a rough cull (tree-class code 30) or a rotten cull (tree-class code 40). As a consequence, some trees were classified as culls even though utilizable sawlogs could be obtained from above the 16-foot butt log (fig. 2).

Starting with the 1988 Arkansas survey, SOFIA used a new tree-classification system that: (1) allowed upper-stem logs to be included in the determination of tree class, (2) provided a more detailed breakdown of trees classed as culls, and (3) made the SOFIA definition of growing stock more consistent with definitions used by the other Forest Inventory and Analysis units in the East. Under this new system, a tree is classified as growing stock if its sawlog section (1-foot stump to sawlog top) meets the national soundness standard (minimum of one-third sound) and contains at least one 12-foot log or two 8-foot logs that meet minimum grade, soundness, and size requirements. Therefore, this new growing-stock definition includes all trees that would have been classed as growing stock under the old definition (fig. 1) as well as some trees that would previously have been classified as culls (figs. 2, 3).

Tree grades are used to differentiate between these types of growing-stock trees. Tree grade is normally based on butt-log grade, but is now based both on butt-log grade and on the ability of a tree's sawlog section to yield utilizable logs. Growing-stock trees classified as culls under the old system are assigned a tree grade of 5, while the others are assigned tree grades of less than 5 that correspond to the quality of their butt logs.

The new system also provides for a more detailed breakdown of cull trees based on their ability to yield any logs that meet minimum grade, soundness, and size requirements. Under the new system, a tree's sawlog section can fail to meet the national soundness standard and still contain at least one 12-foot or two 8-foot utilizable logs. Such trees are still given tree-grade code of 30 or 40, but also are assigned a tree-grade code of 5 (fig. 4). A cull tree containing a utilizable log between 8 and 11 feet in length is assigned a tree-grade code of 6 (fig. 5). Finally, a tree-grade code of 9 is used to distinguish cull trees containing no utilizable logs (fig. 6).

IMPACTS OF THE NEW TREE-CLASSIFICATION SYSTEM

The new tree-classification system's effects on the reporting of tree volumes in north Alabama are shown in table 1. The inventory differences due to the new classification system are more obvious in the hardwood portion of the inventory than in the softwood portion. Depending on whether cubic-foot or board-foot volume is considered, use of the new classification system increased softwood growing-stock estimates by 1 to 2 percent, while increasing hardwood growing-stock estimates by 4 to 6 percent (table 1). This difference is not surprising considering the growth habit and form of most hardwood species. While the new system is more liberal, allowing more trees to be classified as growing stock than under the old system, long-term trends are not affected

Dennis M. May is research forester and John S. Vissage and D. Vince Few are foresters, U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station, Starkville, MS 39759.

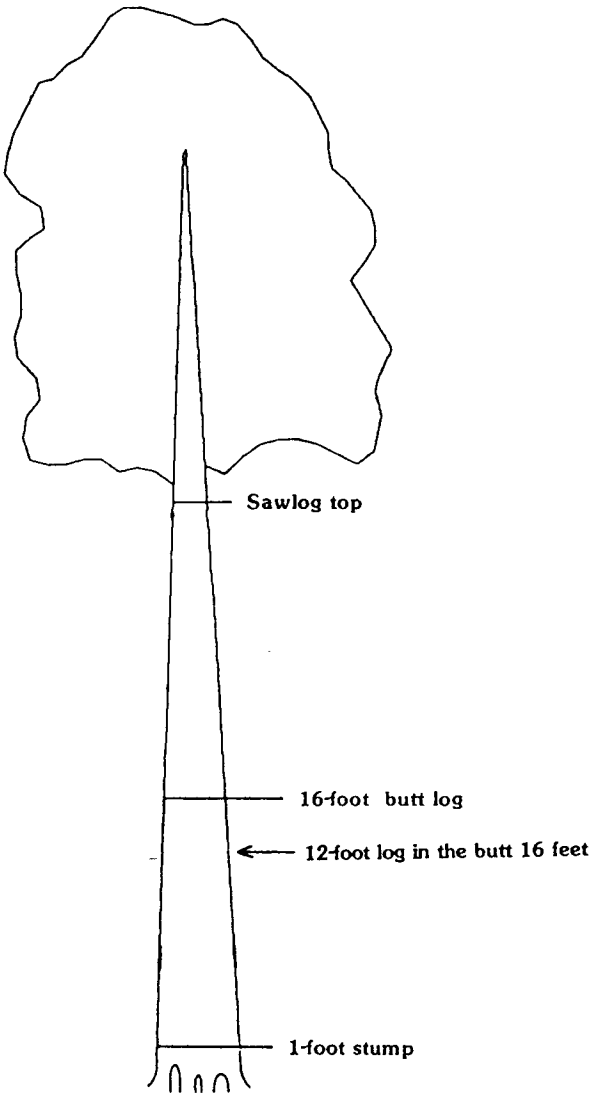

Figure 1.— *Tree meeting the old growing-stock classification requirements.*

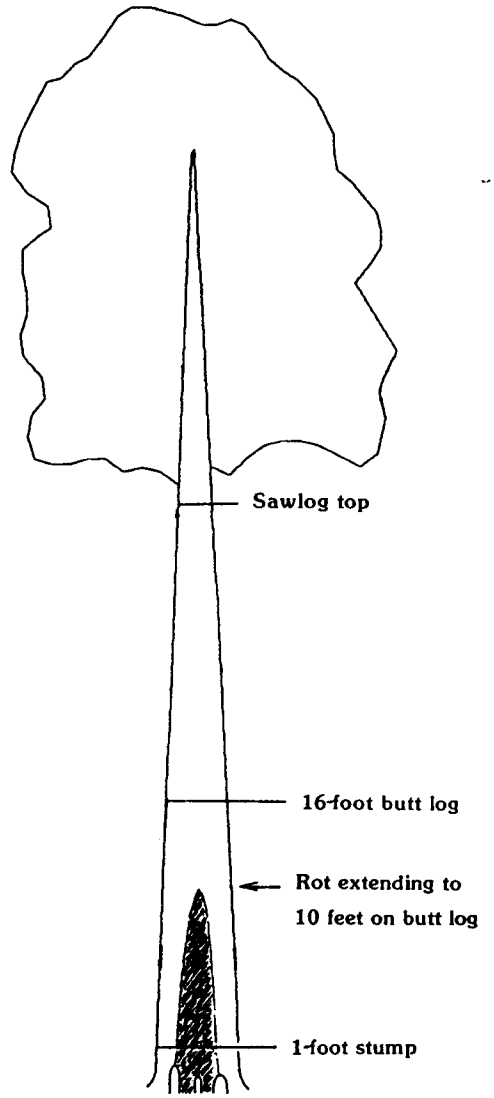

Figure 2.— *Tree classified as rotten cull under the old classification system as a consequence of not considering logs above the butt 16-foot log.*

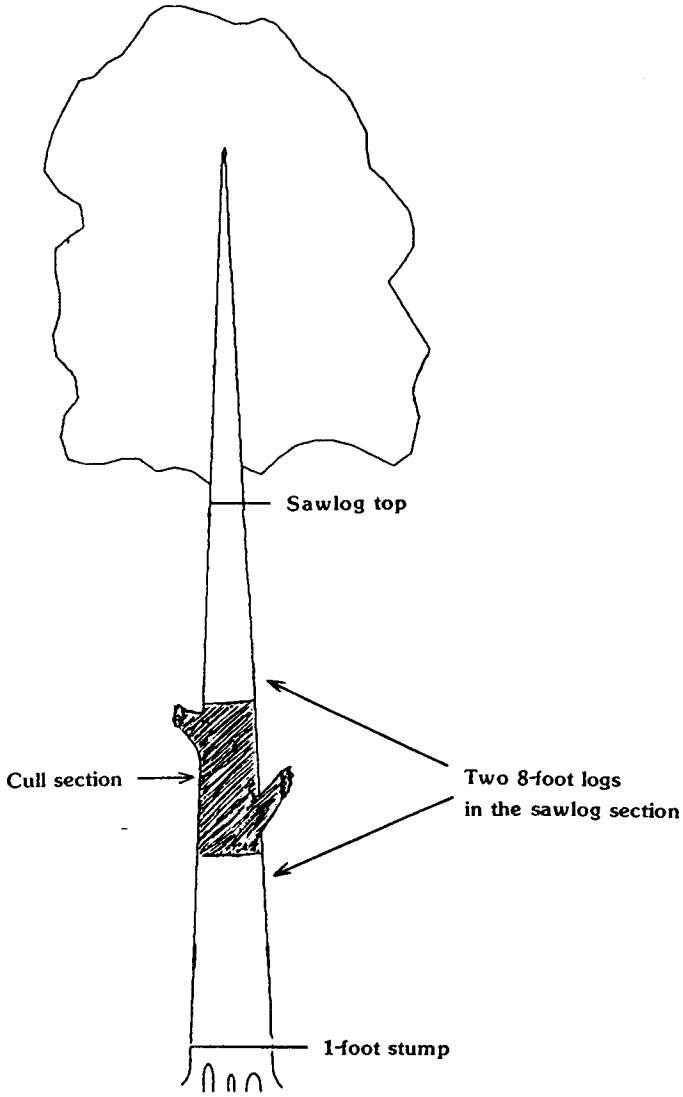

Figure 3.— *Tree classified as rough cull under the old definition and as growing stock under the new definition.*

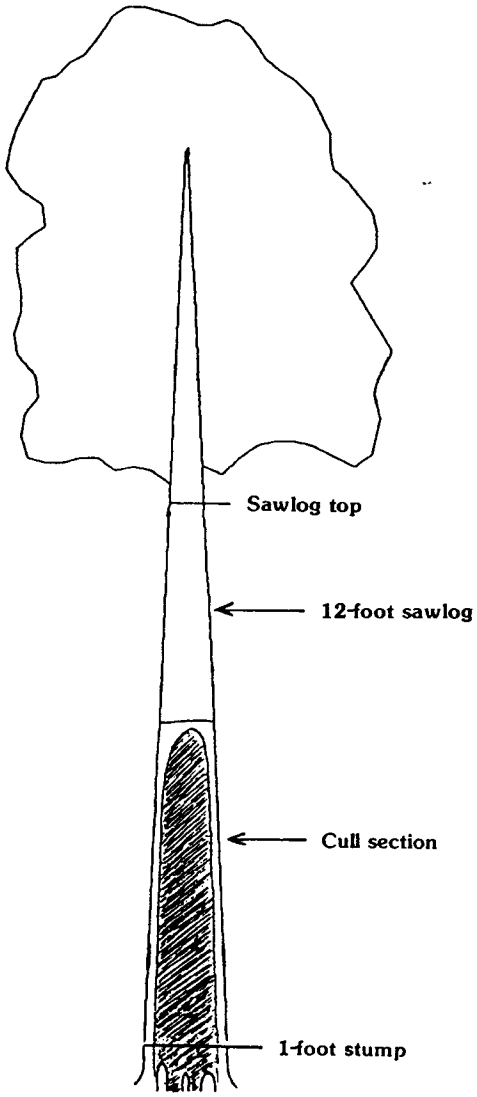

Figure 4.— *Tree-grade 5 cull tree containing at least one 12-foot or two 8-foot sawlogs, but not meeting the growing-stock definition of either the old or the new system.*

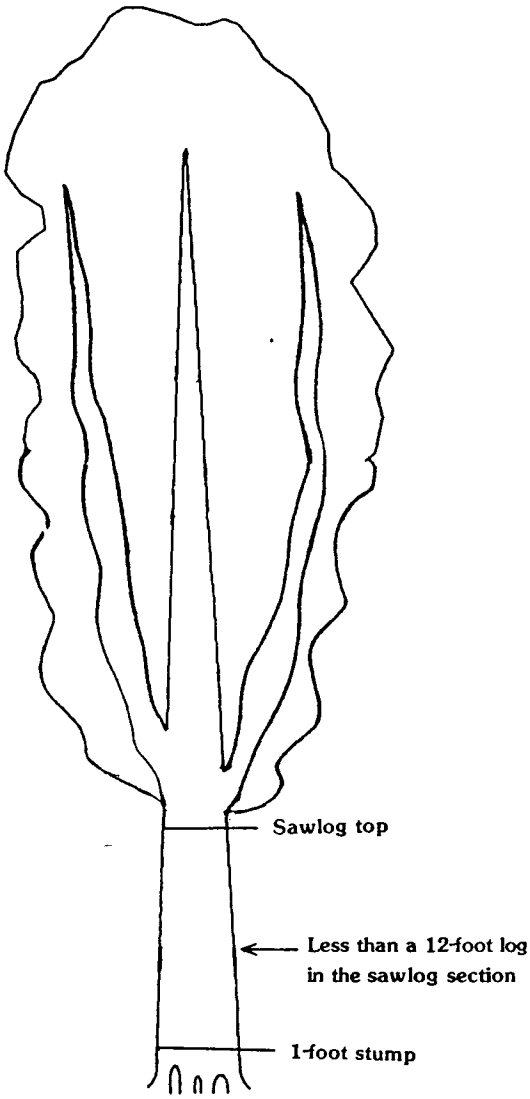

Figure 5.— *Tree-grade 6 cull tree containing a short log between 8 and 11 feet in length.*

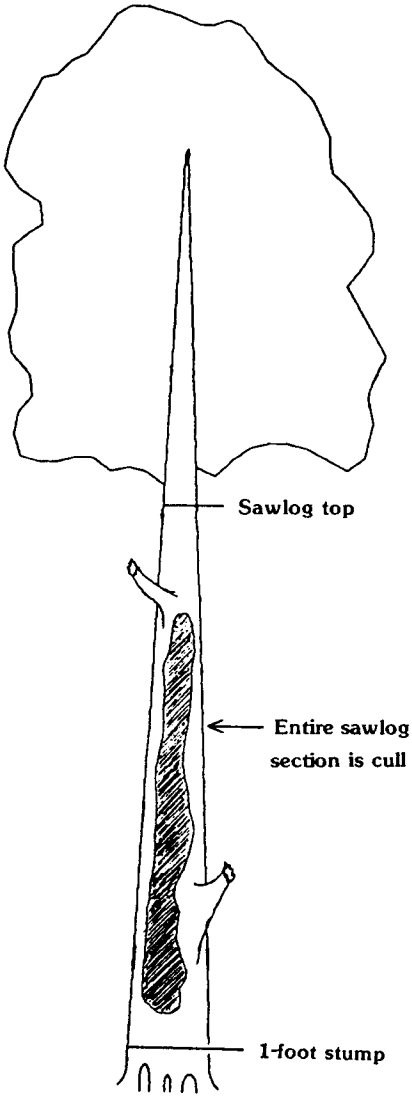

Figure 6.— *Tree-grade 9 cull tree containing no utilizable sawlogs.*

Table 1.—*Distribution of tree volumes in north Alabama under the new tree classification system*

Tree classification	Tree-class code	Tree-grade code	Softwood volumes			Hardwood volumes		
			Cubic-foot	Board-foot	Cubic-foot in sawlogs	Cubic-foot	Board-foot	Cubic-foot in sawlogs
			Millions					
Old definition								
Growing stock	20	0 to 4	601.6	1,851.7	323.1	1,618.5	4,721.7	802.6
	20	5	7.7	30.6	6.1	68.3	271.0	49.8
New definition								
Growing stock	20	0 to 5	609.3	1,882.3	329.2	1,686.8	4,992.7	852.4
Cull								
Log ≥12 ft.	30/40	5	0.2	0	0	5.1	8.5	2.0
Log 8–11 ft.	30/40	6	11.7	21.0	4.1	101.7	158.7	30.1
No log	30/40	9	9.0	0	3.5	91.2	0	48.1
Total cull	30/40	5, 6, 9	20.9	21.0	7.6	198.0	167.2	80.2
Total live (New definition)	20, 30,40	0 to 9	630.2	1,903.3	336.8	1,884.8	5,159.9	932.6

because trees qualifying as growing stock under each system can be identified separately. Also, the new system's more detailed breakdown of cull trees reveals that much of the cull volume in north Alabama is contained in utilizable logs, especially short logs (table 1). Short-log volume, not ordinarily reported by SOFIA, quantifies the increase in sawlog supply available to mills accepting logs as short as 8 feet in length. Special inventory statistics, such as those in table 1, can easily be derived from the SOFIA database because each category of trees can be identified by a unique combination of tree-class and tree-grade codes.

CONCLUSION

The new tree-classification system provides a better means of determining a tree's class and ability to produce sawlogs. It is consistent with the old tree-classification system, so its adoption will not interfere with trend analysis. The new tree-classification system is also more consistent with those used by the other eastern Forest Inventory and Analysis units.

DEFINITIONS

Board-foot volume.—Net volume in board feet (International 1/4-inch rule) of utilizable logs contained in the sawlog section of a sawtimber tree.

Cubic-foot volume.—Net volume in cubic feet of the central stem between the 1-foot stump and minimum 4.0-inch top of the central stem, or to the point where the central stem breaks into limbs, for trees 5 inches or larger in diameter at breast height.

Cubic-foot sawlog volume.—Net volume in cubic feet of the entire sawlog section of a sawtimber tree.

Sawlog section.—That part of the bole of a sawtimber tree between a 1-foot stump and the sawlog top.

Sawlog top.—The point on the bole of a sawtimber tree above which a sawlog cannot be produced. The minimum sawlog top is 7.0 inches in outside-bark diameter for softwood and 9.0 inches in outside-bark diameter for hardwoods.

Sawtimber trees.—Softwood trees 9.0 inches and larger in diameter at breast height, and hardwood trees 11.0 inches and larger in diameter at breast height.

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Trees at USDA Forest Service, Southern Forest Inventory and Analysis, sample locations are classified as growing stock or cull based on their ability to produce sawlogs. The old and new classification systems are compared, and the impacts of the new system on the reporting of tree volumes are illustrated with inventory data from north Alabama.

Keywords: Cull, growing stock, sawlog, tree class, tree grade.

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