

Revised White Pine Stocking Guide for Managed Stands

United States
Department of Agriculture

Forest Service

Northeastern Area
State and Private Forestry

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NA-TP-01-99

Background

Stocking guides are basic tools for forest managers. They provide estimates of the range in acceptable stocking for full occupancy of the site. The first stocking guide for white pine was developed by Philbrook et al (1973). It was of conventional format: showing trees and basal area per acre (in the main crown canopy) by mean stand dbh (the tree of average basal area). The so-called A-line represented maximum stocking, the B-line represented minimum stocking for full site occupancy – the suggested minimum residual stocking after thinning.

Lancaster and Leak (1978) incorporated the Philbrook guide into a white pine silvicultural guide with a couple of changes. Whereas Philbrook's A-line was placed at 80% of maximum stocking, the Lancaster and Leak guide placed the A-line at 100% of maximum stocking based on Frothingham's (1914) yield tables. In addition, the Lancaster and Leak guide included a C-line representing the bottom-line minimum stocking, the line where 10 years of growth would raise the stand to the B-line.

Problem

While these guides served a useful purpose in placing previously unthinned stands under management, it was noted (primarily by foresters in Vermont) that the guides did not apply very well to stands that had been thinned several times. In such managed stands, full crown closure apparently was attained at stocking levels below the B-line and even below the C-line. In other words, when a

repeatedly thinned stand was marked so that adjacent tree crowns were just touching, the resultant stocking was below the recommended stocking.

Solution

To remedy this problem, we looked at earlier published data showing that growth was maintained in managed white pine stands at stocking levels 20 to 40 square feet of basal area per acre below the Lancaster and Leak B-line (Leak 1982). Seymour and Smith (1987) reached a similar conclusion. They concluded that managed white pine could maintain full canopy closure at stocking levels well below the current stocking recommendations, although there might be some loss in growth per acre. Based on the 20-40 square foot reduction, we developed a revised white pine stocking guide for managed stands (Figure 1). This chart shows the Lancaster and Leak B-line and C-line as Unmanaged B and Unmanaged C, respectively. It also shows a Managed B-line as a 20 square-foot reduction in the Unmanaged B-line for small stands (8 inches mean stand dbh) and increasing to a 40-square-foot reduction in large stands (18 inches mean stand dbh). This simply assumes that small stands would be in the early stages of management, while larger stands would have had several thinnings. A Managed C-line was also developed at an estimated 10 years of basal area growth below the Managed B-line. It is interesting to note that our Managed C-line is almost identical to the "lower limit of complete crown closure for managed stands" developed by Seymour and Smith (1987).

Application

In practice, we suggest using the Managed B-line and Managed C-line for stands that have been thinned at least once beginning at 8-10 inches mean stand dbh or earlier. The first thinning would use the Unmanaged B-line or Unmanaged C-line definitions. Subsequent thinnings would use the Managed B-line and Managed C-line specifications. Thinnings in older/larger previously unmanaged stands (12 inches plus mean stand dbh) probably will never fully achieve the crown sizes required for full crown closure at the Managed B-line and Managed C-line. In such stands, stocking recommendations probably should follow the Unmanaged B-line and Unmanaged C-line standards. However, additional experience will be needed to verify or revise this recommendation.

Literature Cited

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Figure 1. Revised white pine stocking guide for managed stands