SAWTIMBER OAK STAND RESPONSE TO SIX DISTINCT CUTTING METHODS

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Nonindustrial private owners control over 80 percent of the 50 million acres of oak-dominated forest in the northern United States. Although non-commodity amenities are more important than timber production for many of these owners, the expense of forest ownership may make them amenable to forest management practices that provide income while retaining the desired non-commodity amenities. The effects of distinct cutting methods on stand growth and dynamics were examined in a study established in 1981 to 1984 in three southern New England forests. Cutting methods were: shelterwood, diameter limit, coppice with standards, commercial clearcut, silvicultural clearcut, and an unmanaged control. The cutting method plots (4 to 7 acres) were on medium quality sites (SI = 65). Permanent 10-factor prism plots were established before initial treatment, were remeasured in 1998-99, and again in 2001 following the second cutting cycle.

Basal area averaged 92 ft^2/ac before harvest, 68 percent of which was in sawtimber trees. The initial harvests reduced basal area by: diameter limit (38 percent), shelterwood (56 percent), coppice with standards (58 percent), and commercial clearcut (76 percent). Over the next 16 to 17 years, annual basal area growth was highest on commercial clearcut plots (2.8 ft^2/ac) and lowest on shelterwood plots (1.5 ft^2/ac). Diameter limit and commercial clearcutting accelerated the shift from oak-dominated to maple/birch-dominated forests. The coppice with standards treatment retained oak in both the poletimber and sawtimber size classes. Cubic-foot volume growth did not differ significantly among cutting methods, averaging 56 ft^3/ac/yr (fig. 1).

After the second cutting cycle, the proportion of poletimber volume (ft^3/yr) lost to cull was highest in the commercial clearcut plots (13 percent). The other partially cut plots, diameter limit (5 percent), and coppice with standards (4 percent), had lower cull losses than the unmanaged control plots (8 percent). Absolute cull losses were also higher in the commercial clearcut plots (fig. 2).

Board-foot volumes (1/4-inch International) averaged 8,200 bf/ac before the initial harvest. Sixty-eight percent of sawtimber trees had butt-log grades of 2 or better. Harvested volumes ranged from 3,400 bf/ac on the coppice with standards plots to 7,800 bf/ac on the commercial clearcut plots. Somewhat surprisingly, board-foot volume growth was similar on unmanaged, diameter limit, and shelterwood, and coppice with standards plots (259 bf/ac/yr). Volume growth was significantly lower on commercial clearcut plots (118 bf/ac/yr). Total board-foot yields (final volumes plus harvested volumes) for the silvicultural clearcut (7,400 bf/ac) and commercial clearcut plots (10,100 bf/ac) were significantly lower than for uncut, shelterwood, and diameter limit cuts, 12,800, 13,100, and 13,500 bf/ac, respectively (fig. 3).

This study found that four distinct treatments: shelterwood, diameter limit, coppice with standards, and no management resulted in similar stand volume (board foot) growth rates. Therefore, the first three methods can be used by landowners who wish to generate income to offset expenses (real estate taxes, insurance, management costs) and realize a return on investment. The choice among cutting methods should be dependent on the esthetic and regeneration goals of the landowner. Although commercial clearcutting had an initially higher harvested volume, low quality of residual trees and depressed stand growth rates indicate it is not a viable option for long-term forest management.

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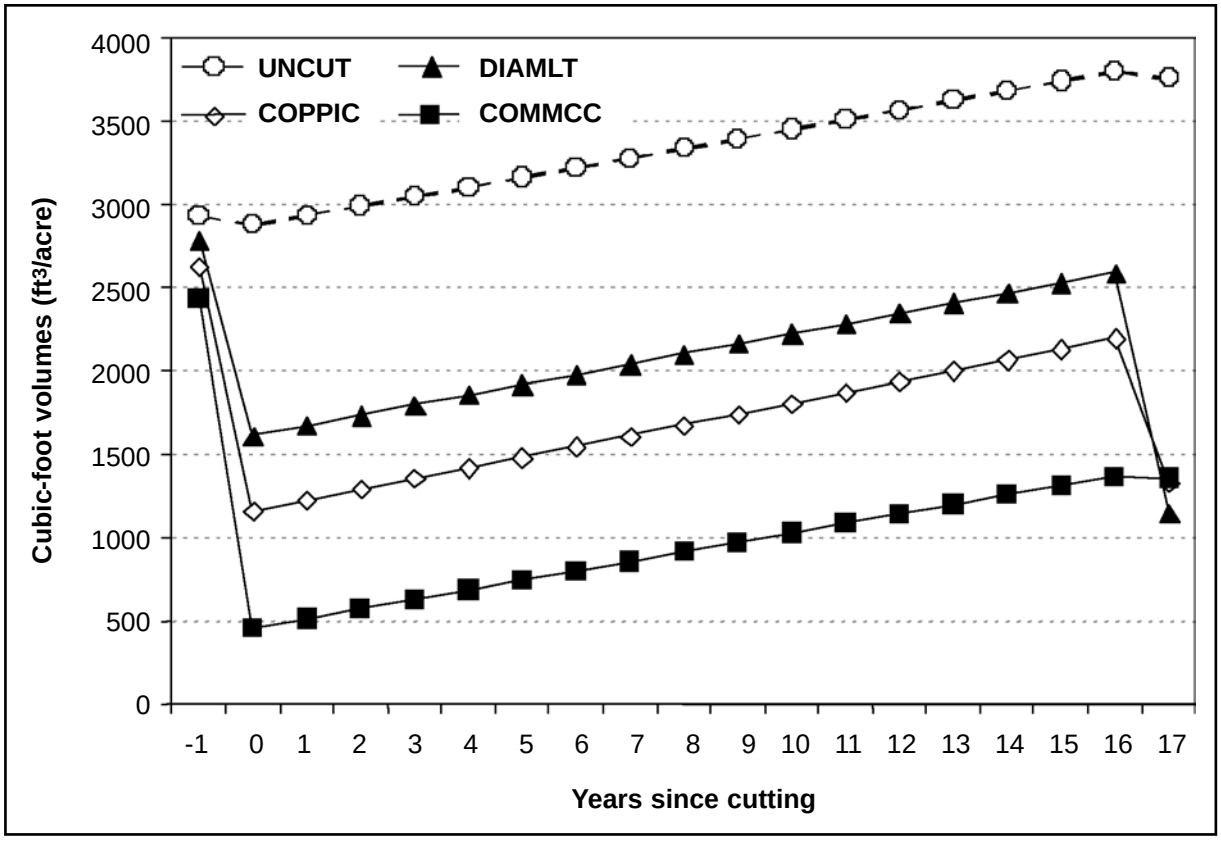

Figure 1.—*Changes in cubic-foot volume (ft³/ac) over time by cutting method. Stands were cut in years 0 and 17.*

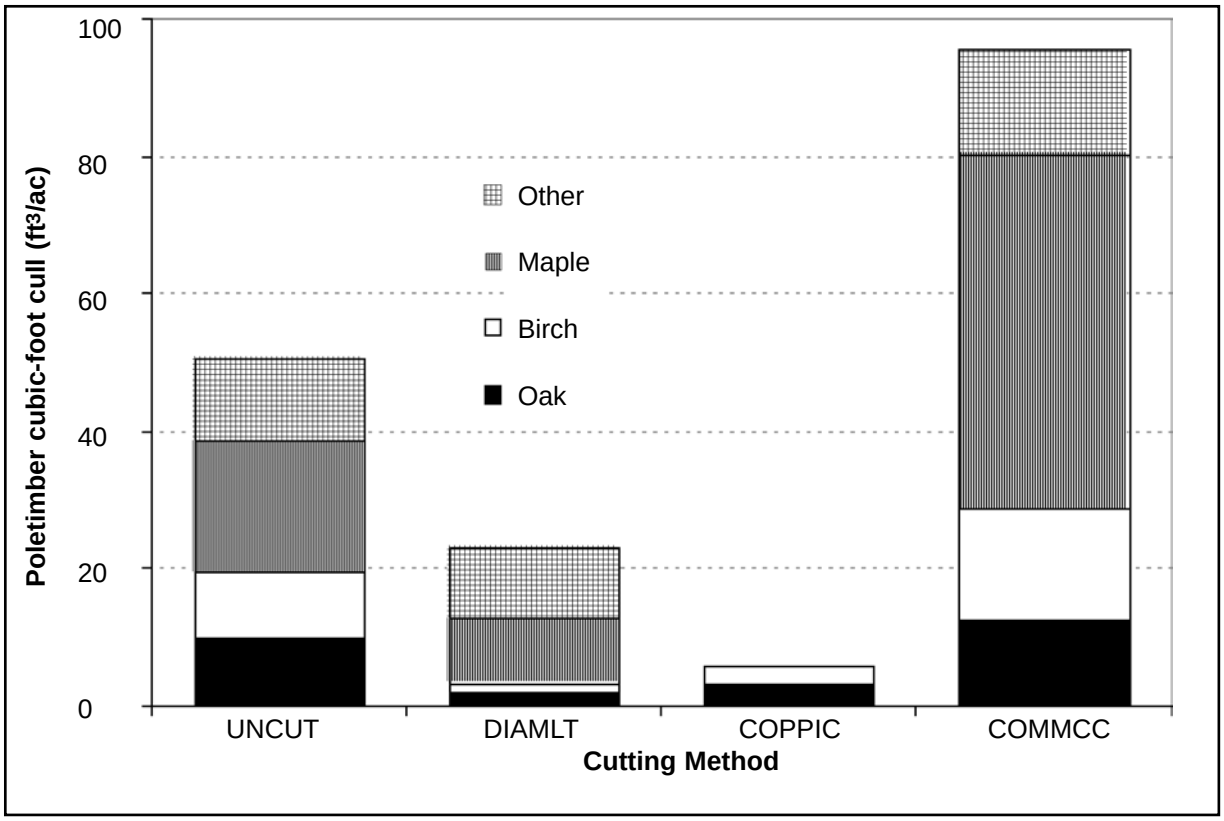

Figure 2.—*Cull volume loss (ft³/ac) in residual poletimber after the second cutting cycle by cutting method and species group.*

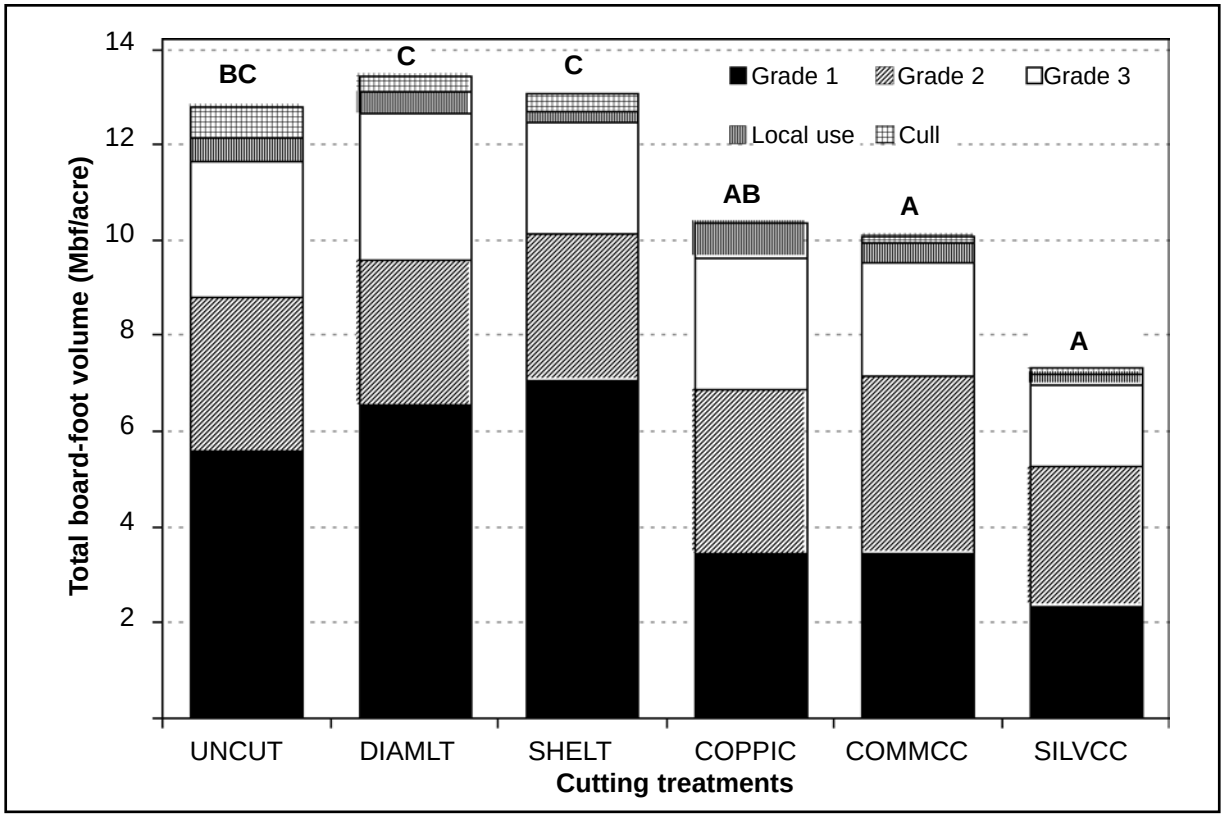

Figure 3.—*Total board-foot volume (International ¼ Mbf/ac) 14-17 years after initial harvest by cutting method. Total volume = harvested + residual + growth. Total volumes with the same letter were not significantly different at $p \leq 0.05$.*