FOLLOWING THE FATE OF HARVEST-DAMAGED TREES 13 YEARS AFTER HARVESTS

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ABSTRACT

Introduction

Logging damage to residual trees during harvest operations can reduce the future volume, quality, and value of wood products. Timber harvests in 1996 on the Missouri Ozark Forest Ecosystem Project (MOFEP) provided a rare opportunity to follow the fate of trees wounded by felling or by skidding with rubber-tired skidders.

Methods

Study sites on MOFEP are in the western Central Hardwood region in oak-hickory and oak-pine forests. The predominant species on MOFEP are white oak *(Quercus alba)*, black oak *(Q. velutina*), scarlet oak (*Q. coccinea)*, shortleaf pine *(Pinus echinata),* and hickories *(Carya* spp.), which account for 86 percent of the trees and 87 percent of the basal area of trees ≥4.5 inches diameter at breast height (d.b.h.). Tree survival rates on MOFEP were determined in the dormant season of 1997-98 on 9,749 live trees, of which 938 were bark wounded in 1996, and monitored again in 2009-10 during the MOFEP overstory inventory conducted on 298 permanent 0.5-acre vegetation plots on 6 study sites ranging in size from 772 to 1,271 acres. In summer 1997, the following bark wound dimensions were measured on wounded trees: wound width, length, height above ground line, and azimuth the wound was facing. In summer 2009, bark wound dimensions were remeasured on 745 live trees, 13 years after harvest, to determine bark closure rates. Analysis of variance was used to examine the interaction of wounding with species, management method, and crown or size class on tree survival and on wound closure. For significant effects, the Scheffe method of multiple comparisons was used to compare individual means.

Results

The survival of all trees was greatest for white oak (96 percent), followed by hickories (93 percent), shortleaf pine (85 percent), scarlet oak (76 percent), and black oak (73 percent) over a 12-year period (P = 0.0008). The survival of all bark-wounded trees (87 percent) was slightly higher than for nonwounded trees (82 percent) on the same vegetation plots (P = 0.007), although there is no apparent explanation. Survival in wounded trees (P = 0.0031) was 99 percent for white oak, 92 percent for hickories, 84 percent for black oak, and 73 percent for scarlet oak. Survival on sites under even-age management was 86 percent compared to 83 percent survival on uneven-aged sites, but the difference was not significant. Wounded trees within the dominant crown class had 93-percent survival; survival rates decreased with decreasing crown class to suppressed trees with 74-percent survival (p = 0.0557).

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After 13 growing seasons, the wounds of 76 percent of the trees that had been damaged during harvesting had completely closed, including the 23 percent of wounded trees that had multiple wounds. White oak was the most effective at closing all bark wounds (P = 0.0161) at 92 percent, followed by scarlet oak (82 percent), black oak (58 percent), hickories (36 percent), and shortleaf pine (17 percent). Crown position was not a significant effect on the ability of trees to close bark wounds (P = 0.1492), nor was size class (P = 0.2082) when evaluating large saplings (4.5 to 6 inches d.b.h.), pole timber (6 to 11 inches d.b.h.), and saw timber (≥11 inches d.b.h.).

Discussion

Dwyer et al. (2004) attributed the low incidence of tree damage after 1996 MOFEP timber sales in part to close communication between timber sale administrators and timber buyers and logging crews. Topics of discussion should include careful location of skid trails, landings, and haul roads to avoid future crop trees when possible. Overall, our analysis showed that wounding during felling and skidding operations would not increase tree mortality, and the wounds of the damaged trees are likely to close or heal within 13 years. When possible, damaged trees should be culled during the current operation as the wounds might not be noticeable during timber marking for the next harvest entry.

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Literature Cited

Dwyer, J.P.; Dey, D.C.; Walter, W.D.; Jensen, R.G. 2004. **Harvest impacts in uneven-aged and even-aged Missouri Ozark forests.** Northern Journal of Applied Forestry. 21: 187-193.